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FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

cking specks out of orange
ice with vacuum nozzles

SEPTEMBER 1945

THE ATOM—
New Energy Source

Problems That Face
Food Processors

Processing
Orange Products

Will Agriculture
Collapse?

Blanching with
Electronic Heat

Ways to Get Jump
On Competitors

Freezing Cooked
Foods

McGRAW-HILL PUBLICATION

Proof in Pictures.....

One of three CP Ammonia Compressors providing economical refrigeration for Butterman Ice Cream Company, Louisville, Kentucky.

Finish the Job—Buy Bonds ©

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THE COVER

A bit of ingenuity has solved a quality-control problem in the Exchange Orange Products Co. plant. To "de-speck" the juice before canning, it is flowed slowly over a glass panel illuminated underneath by fluorescent lamps. Workers watch for any bits of seed or other extraneous material and pick them out by hand-operated vacuum pipes.

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McGRAW-HILL PUBLISHING CO., INC., James H. McGraw, Founder and Honorary Chairman. PUBLICATION OFFICE: 210 S. Desplaines St., Chicago 6, Ill. Return postage guaranteed. EDITORIAL AND EXECUTIVE OFFICES: 330 West 42nd St., New York 18, N. Y. (Address correspondence here.) BRANCH OFFICES: 520 North Michigan Ave., Chicago 11; 68 Post St., San Francisco 4; 739-9 Oliver Bldg., Pittsburgh 22; Aldwych House, Aldwych, London, W. C. 2; Washington 4; Philadelphia 2; Cleveland 15; Detroit 2; Los Angeles 14; St. Louis 1; Boston 16; Atlanta 3. JAMES H. McGRAW, JR., President; CURTIS W. McGRAW, Senior Vice-President and Treasurer, HOWARD EHRLICH, Vice-President (for business operations), WILLARD CHEVALIER, Vice-President (for editorial operations), JOSEPH A. GERARDI, Secretary, and J. S. BLACKBURN, Jr., Director of Circulation. CABLE ADDRESS: "McGRAW-HILL, N. Y." Member A. B. P. Member A. B. C. Contents indexed monthly in Industrial Arts Index. Copyright 1945, by McGraw-Hill Publishing Co., Inc.—All rights reserved.

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THIS IS IT

V-J Day has come. You're on your own now. Food processors face a host of serious problems of their own. At the same time they must help to achieve full peacetime employment

By L. V. BURTON, Editor

EXCEPT for price control and a moderate amount of rationing of still scarce goods, business is pretty much its own boss—from now on. There will be no more allocations, no more WMC control of hiring, no more priority for procurement. Sales to the government will be greatly reduced. War contracts valued at tens of billions are being cancelled. Millions of war workers are to be turned loose, some going back to their former homes, some seeking work in new locations, some hoping to get new jobs and to remain right where they are.

Management is now trying to get industry back into peacetime production. All the postwar plans of industry were made for just this occasion.

The food processing industry's greatest contribution to immediate postwar employment will be orders for capital goods—equipment.

Industrial management is well aware of the leftist trend of public opinion today. Management well knows the popular saying is that business is on trial—that it is freely stated that this is to be the last chance private industry will ever have to produce full employment—that, unless this postwar effort of business to create full employment succeeds, then government will have to take over all industry.

Absurd though such ideas may be, it is, nevertheless, the current pattern of thinking of an enormous number of people.

A realistic evaluation of current popular aspirations will show that, from a strictly political viewpoint, there are enough people who entertain such ideas to constitute a majority at the polling place. And, realizing this, all men in management are bending every effort to reconvert promptly from the shutdown war plants to active producers of the much needed goods of peace. If the effort should fail to provide jobs for all who want to work, it will not be because of any reluctant attitude of business management today.

Prerequisites to Full Employment

In the long view the real test of postwar planning will not come until about 1948 to 1950. The huge unsatisfied civilian market makes promptness of reconversion of war industries the controlling factor in employment in the near future. But the controlling factor in employment in the more distant future will be the ability and the willingness of people to buy at that time. Willingness, in turn, will be influenced by many forces other than mere buying power—the fetish of so much of the current economic thinking of organized labor. This is the basis of the demands for wage increases to compensate for loss of overtime wages. Other factors will be taxation, prices, hours of labor (for there are many things people will buy provided they have the free time in which to enjoy them), social-security benefits, pensions, and a continuing flood of inventions—new things and gadgets that people will insist on owning—and lastly, but most important of all, confidence in the future. Given confidence, people can be counted on to buy and to produce, to earn and to SPEND FREELY! Let the people lose that confidence, begin to economize and oversave against an ominous future, and all the best laid postwar plans of management will be so much wasted energy.

New Inventions Needed

Looking beyond the immediate years of reconversion to the period of the real test of the free-enterprise system, it would appear that the greatest need—next to that vital intangible, confidence—is a continuing flood of new inventions and gadgets. Here is where most of the additional new jobs must come from. Television and the helicopter are the hope of many. But it will take many more new industries than television and private aviation to take up the slack of unemployment some years hence. Such yet-to-be-invented things as a cheap gyroscope compass that every cross country tourist will want in his car, or a cheap folding bicycle-like gadget for attachment to heavy traveling bags where no Red Caps are available, automatic pot and pan washers, screens that keep out dust, or self washing windows and woodwork, windows that close at the first drop of rain, funneled keyholes, a better can opener, a cheap electronic stove, or single-use tableware (china), and the like, are the sort of inventions that will create new employment. The need is not merely to keep people at old jobs, but to make more new jobs.

The greatest service the food processing industries can contribute to the general plan of creating more jobs is to make it possible for people to spend a larger

portion of their incomes for those new job-producing novelties rather than for the sheer necessities of life.

By all means, let the food processing industries employ all the people they can. Yet always strive for lower unit costs, lower selling prices and smaller distribution costs. Wartime experience has proved that food consumption can be increased somewhat when everyone can afford to buy all the food he wants. Cutting food costs increases consumer buying power. There is, of course, a limit to the capacity of the human stomach.

Thus, the way to full employment, as far as the food processing industry can create employment, is the production of good tasting, nutritious food at the lowest possible cost. (See the editorial foreword in the February, 1945, FOOD INDUSTRIES for further elucidation of the argument.)

Outstanding Problems Facing Our Industry

Yet, in spite of the apparent simplicity of the foregoing principle, its immediate application is not to be very easy for the industry. There still are certain world shortages that must be overcome before the food industry can go all out. These shortages are in coal, fats, sugar, transportation and tin. Prior to V-J Day they were serious—even grim. Just after that day, coal and fats seem to be in much easier condition, but the other three deserve close attention.

TIN SITUATION

ON August 15, OPA announced freeing all canned fruits and vegetables from further rationing. What this really implies is not immediately available. It is to be hoped that it means that the Army surplus reserves of canned foods are to be sold into consumption so that there will be no burdensome canned food surpluses hanging over the market as in 1919-21. Nevertheless, as of mid-August, just before V-J Day, the tin situation was cause for considerable anxiety, not for 1945 but for next year. And until reliable information from the Far East proves otherwise, the tin problem of the future is not to be regarded as a simple one.

The Tin-Lead-Zinc Division of the War Production Board has told industry again and again that the tin situation is acute. But until July of this year, because of military security requirements, it has not been able to publish figures backing up its statements.

The U. S. stockpile of tin is now down to about 20,000 tons, less than a normal three months' supply in peacetime. There is also a still smaller tonnage in the hands of the armed forces. All of the primary tin that the United States produces you can put in your eye. This is one strategic material that must be imported if we get it at all. Malaya and the two islands, Banka and Billiton, lying off Java, were the most important sources of our tin before the Japs took them over. The principal other sources of tin are Bolivia, Belgian Congo and Nigeria, but the total supply from these areas has been small compared to the demand from the United Nations. We are getting our fair share of the available supplies (we imported 49,875 long tons in 1944). But apart from secondary (recovered) tin, this only covers around 60 percent of our pig tin requirements, the remainder being taken from stock pile.

Tin and terne plate required 26,337 long tons of tin in 1944, brass and bronze took 33,625 tons, solder used 13,868 tons, tinning took another 8,503 tons.

Total consumption, in the face of wartime conditions, tin recovery, WPB's M-81 order, *et al.*, has been going up. In 1941, we used 81,840 tons of primary and secondary (recovered) tin. In 1944, the total had gone to 90,352 tons. On a comparable basis, 1945 consumption is at the rate of about 92,000 tons.

Reconversion of all industry is to give postwar jobs. Reconversion of the auto industry is under way, yet each car made on previous designs will use roughly 8 lb. of tin. A normal 4,000,000-car year would use up 15,000 tons, or about 75 percent of the national stockpile. Yet we need the cars, and the people need the jobs.

Question: Who is to be deprived of tin? Canners, armed forces, auto industry or who? There is far from enough to go around.

Possible Effects on Food Processing

At the moment, the principal concern is the availability of tin for the canning industry in the next two or three years. Tonnage-wise, foods preserved by canning amount to about 90 percent of the total of preserved foods. Roughly only 10 percent of the foods preserved by heat sterilization are packed in glass. Glass canning can be expected to expand somewhat to help meet the future demand. But if much more tin is not shortly available, except where glass canning can carry the load, the burden of preservation of perishable foods may shift in considerable measure away from heat sterilization to quick freezing and dehydration. Many readers of FOOD INDUSTRIES have urged us to lay off dehydration, but unless a miracle occurs between now and April, 1946, you may see an increasing need for vegetable dehydration. Quick freezing cannot be expected to take up all of the load so suddenly. It is possible that the American public will be eating dehydrated foods in a big way in 1946 and 1947, and liking them, unless the miracle comes by next Spring.

This miracle will be nothing more than a greatly augmented tin supply. It will have to come from Malaya, Banka and Billiton. There is no other important source. Japan has "surrendered" in its peculiar way, but this is no guarantee that the enemy soldier in the tin producing area has also surrendered.

After Occupation of Japanese Territory—What?

The Japs have not needed tin in their economy as do we. Therefore, they have not used labor in Malaya to produce the metal when such labor could be used elsewhere to provide the things that Japan needed. This means that the big factor in the tin producing areas, after release from Japanese control, will be the availability of labor supply. The chances are that coolie labor will have been moved out of the area, and officials in Washington are very pessimistic regarding the availability of skilled or common labor in Malaya. Another important factor is, of course, equipment. It is believed that the dredges by which the tin is mined in that area have been dismantled to provide steel scrap. This would indicate that new machinery will be required. And if by good luck the labor is available, then ample supplies of food and trade goods must be shipped in. Otherwise, the natives will not work. Money as we know it means nothing to them. It seems to be quite evident that machinery will be lacking. Therefore, hand operations will get

under way first and a fair tonnage of tin ore can be extracted during the first year.

Prewar tin operations in the Malaya Straits area utilized 300 dredges. There are at the present time two dredges in Australia, and these the Navy will move in. It has been estimated that some small dredges can be produced in a year's time, but that about five years will be required to get the operation back to normal.

A second method of operation, gravel pumping, requires the availability of electric power. If the power is there, if the pumps are there, and if the transmission lines are in working condition, this form of production can start promptly. But this seems too much to expect. Diesel power and small pumps which can be delivered in about a year's time after recapture of the mines will, however, enable gravel pumping to be the next operation to get under way. The installation of new dredges for large-scale operations will take considerably longer and will depend somewhat on the size of the ore body that remains to be mined. The body of ore that remains may be too small to make the installation of new dredges feasible from an economic viewpoint.

In any event, in the first year after the release of the Malayan Peninsula, tin production is bound to be small. It is a fair guess that in the first year we will see production at about 20 percent of normal; in the second year, 50 percent; and in the third year, 75 to 80 percent—with the strong possibility that what is known as normal prewar production never will be achieved again. Some optimists, on the other hand, have hopes that the Japs will have available a sizable tonnage of the vitally needed metal all smelted, or in the form of concentrates, ready to be shipped to the United States when the mines are taken over. This hope is not shared by those who know the most about the tin situation. Furthermore, the mines are in British and Dutch areas, and it is up to those nations to restore them—not us.

Additional ways of conserving tin are under consideration. One of these is the possible use of ¾ lb. electrolytic plate for evaporated milk. This would save an estimated 800 tons of tin, which will help, but not much.

Canners in particular are watching the situation closely to be ready to act constructively if the bad news becomes an official order. They may have to shift in part to another method of food preservation in order to retain their volume of business. Unless ample tin supplies become available in a reasonably short time, the food preservation industry will face a number of important postwar crises.

TRANSPORTATION

IN the matter of transportation, there is no need to recount here what everyone knows about the problem of rail transportation at home. With the stoppage of traffic in munitions, it is to be expected that the railroads' freight problems will ease promptly. But the problem of ocean transportation for imported raw materials is not so easily resolved. Our own soldiers in Europe, the Pacific Islands and Japan must be supplied and fed. It is very doubtful if our occupying troops can be fed by Japan, always a poor country.

Then there are millions of our own men still to be returned to their homes from literally hundreds of places overseas. This should not be a stupendous problem, nor one requiring more than two years, but there is also the problem of repatriation of a million or so Japs, soldiers and civilians, from all over the Pacific and the Far East. The temper of the Allies is to send every last Jap back to his homeland, whether he likes it or not. But Japan has very few ships left. Yet, to permit the Japs to remain in the various islands and invaded countries is to permit them to win the war by our default and permit the existence of a thousand foci of infection that will surely result in more fighting. Until the United Nations decide their policy here, it is safer to count on scarcity of ocean transportation for some time to come. These Jap repatriates must be fed enroute to Nippon, which will be a further burden or a further market, depending on your viewpoint, for the food resources of Britain and United States, which own most of the world's merchant shipping today.

THE SUGAR SITUATION

AS long as the sugar shortage is so acute that it is front-page news — and on every housewife's tongue, as well as the subject of Congressional inquiry —there is no occasion to recount it. We are now down to 72 lb. per person per year compared with 105 lb. prewar.

Our esteemed friend, Rexford Guy Tugwell, Governor of Puerto Rico, has come in for many a blast of criticism for cutting down sugar production on that island. While if he were wholly malicious we would enjoy being the first to admit it, the truth is that he had attempted in his peculiar way to force the Puerto Ricans to produce their own food instead of going in for a one-crop agriculture. The amount of sugar that island has failed to produce is, however, not a drop in the bucket of the world demand.

The fault lies largely in the dim-witted handling of the food, molasses and alcohol situation by Washington in the year 1940 to mid-1945, gravely aggravated by the drought that has affected the entire Southern Hemisphere and even the tropics north of the equator. We can forgive the international quota agreements that attempted to balance supply and demand prior to the second World War. But it is not possible to condone the shortsighted policies that Washington has pursued beginning with Pearl Harbor.

Screams of dismay over exportation of sugar to France do not alter the fact that General Eisenhower's armies ruined one French sugar crop in 1944 by fighting across the beet fields. The 1945 French beet sugar crop will rot because of the fuel shortage there. Eisenhower promised in 1944 to help them out with some sugar from the U.S.A. That promise must be kept.

Instead of excoriating public officials today about the sugar mess, it would have been better to have raised hell about it two years ago. The entire world recently has been canvassed for surplus sugar stocks. They do not exist. There are, however, some superoptimists who think there is a lot of sugar available in Java, an optimism in which we do not share. All Europe will be freezing and hungry in the coming winter. If anyone thinks it will contribute to international peace in the future for it to be known that the U.S.A. continues to eat generously while Europe starves, he had better go overseas and gain a firsthand knowledge. A little sugar won't save many lives, but it can go a long way to make the coming winter a little more bearable. If we could keep all the sugar we could get our hands on in 1945, the sugar situation would still be a mess.

The Talk of the Industry

• FOOD INDUSTRIES is seeking an engineering editor. It's a good job. See the specifications on page 114 of this issue.

• THE best wisecrack we ever heard was the one about: Millions of people pray for Eternal Life, yet don't know what to do with themselves on a rainy Sunday afternoon.

• WORK is the cheapest form of escape from boredom that mankind has yet been able to invent. You even get paid for it.

• A NEGLECTED item of unfinished business is a June order from WPB. It ruled that wine, beer, whiskey and soft drinks are not food when deciding on the wartime uses of can enamels.

Between such WPB oddities and OPA's quaint notions of what constitutes food processing, we foresee a postwar muddle that will take years to straighten out.

• THANKS to the peculiarities of rationing, many people have been forced to eat some 88- and 89-score butter or do without any form of bread spread.

• ALL the signs point to a great expansion of the frozen food industry—postwar. Yet, unless more tin becomes available in a few months, the expansion will be forced upon orthodox canners as well as freezers in 1946. Glass canning will, of course, carry a substantial part of the load. Read "The Tin Situation" in this issue and draw your own conclusions.

But if you are going into freezing for the first time: (*a*) Don't overlook the need for freezer storage space for your production; (*b*) don't overlook the need for refrigerated transportation; (*c*) make up your mind to freeze your best quality raw materials. Reason: Up to now the market for No. 2 quality frozen foods is pretty thin.

• AF OF L seems to be taking a leaf from the experience of CIO and has sent about 200 of its organizers to take a short course in labor economics at University of Wisconsin. Also, two international vice presidents go to Harvard for a year. The union (Almagamated Meat Cutters Union) states that labor representatives without academic knowledge and economic training will be misfits and unworthy to represent workers.

All this is very commendable. A comparable study of labor and union activities on the part of industry would also be in order. Both sides would benefit materially by better mutual understanding.

• IF one indulges in a little imagineering about the food business, one sees that the processor's greatest competitor is the housewife. And following this train of cerebral meandering one arrives at the conclusion that, when food industries have done the job that lies ahead of them, the homemaker will spend little time in the kitchen. Come mealtime and the little lady will take factory prepared plates of food from the refrigerator or the shelf, put them into a little electric stove and a very few minutes later place them on the table before an eager family. Come meal's end, the fiber plates in which the food was packaged, and from which it was eaten, will go into the garbage can and the family can go immediately to the movies.

This is not altogether stardust. Meat and two vegetables, partially cooked, quick frozen and packaged on partitioned fiber plates, is supplied to Naval Air Transport planes. Kept in a refrigerator, the food is readied for eating by a little electric stove which finishes the cooking in a matter of 15 minutes. What would be wrong with that on the maid's day off?

Hors d'Oeuvres

• Best sign in victory parade at Times Square: "Japan Got Atomic Ache."—Sort of indigestible, that U-235.

• *The atomic era came before we were ready for it. We haven't even figured out electronics yet.*

• Flash, flash, flash.—We predict: There will be no food shortage in the next war. After a few salvos of atomic rocket bombs there won't be anybody with a stomach except a few farmers in the open spaces, and they grow their own food.

• *We have DDT to annihilate insects; 2-4D to annihilate weeds; penicillin, sulpha and streptomycin to annihilate bacteria; electronic traps to annihilate rodents; and U-235 to annihilate man. Looks like an even to better chance that all of the world's troublemakers may some day vanish.*

• Now that man has bent the atom to his will, the technologist must forever hence study its practical possibilities. There being no earlier time to start than now, what can be done with U-235 in the food industries? Well, fishermen might blow a hole in the ocean into which fish would fall to be scooped up by a steam shovel. Then farmers might mix it with fertilizer to grow popcorn with a built-in explosive that could be touched off by radium rays. Following the same train of thought, it might be used to puff cereals. And then—well, suppose you take over.

• *In each successive war year, total farm production has been greater than in any preceding year. And there has been 10 percent more food per capita for civilians than in 1917-18. No, it really hasn't been such a tough war on the home front.*

• Americans are said to have consumed 500 billion feet of spaghetti last year. No wonder we're not very mad at the **Italians.**

• *Technological tip: The first patents abstracted in FI have just expired. But a 17-year old invention ain't what it used to be.*

• Prosperity index: People in U. S. ate 22,325,965 gal. more of ice cream last year than in 1943. And they successfully home-fronted a two-front war in spite of such luxury—or perhaps because of it.

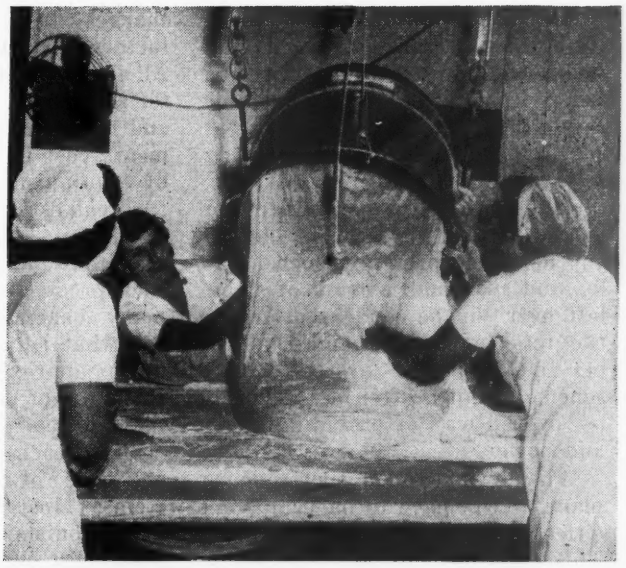
• *New product—Hershey sandwich—Chocolate bar placed between slices of warm toast—Melts on the bread and then in your mouth—Hope you like it. Note to Hershey: No charge for promotion—Other chocolate bars are good, too.*

• "Baby Talk"—the publication, not what you said to the blonde—reports a rising birth rate for the first 5 months of 1945, contrary to expectations. Maybe the storks are jet-propelled these days. Anyway, its new food business, however it came about.

F. K. L.

Ewing Galloway

Bond bread coming out of oven at rate of 4,000 loaves an hour, an example of low-cost operation through a high rate of production.



Wide World

Quality at a price is another means of achieving success. Pepperidge Farm, South Norwalk, Conn., has demonstrated that.

18 Ways for Bakers To Get Jump on Competitors

Facing stiff competition postwar, the baker will have to watch cost and quality P's and Q's. Here are pointers from a man with broad industrial know-how. All processors may profit from his suggestions

By GREGORY M. DEXTER, Consulting Engineer, Scarsdale, N. Y.

THE successful bakery will take its cue from some national or chain-store bakeries, with a few hints from independent bakeries. It will then survive the increased competition that will come from the decreased demand for bakery products with the return of normal meat supplies and less employment of women in factories.

Some baking organizations, national and independent, have learned the value of the scientific approach of the accountant, chemist and engineer who gather the facts and analyze them. Such analysis leads to better methods, lower costs and improved products. The great development of the chemical industry is due to the scientific approach as compared with the rule-of-thumb or hunch method. Experience is valuable, but it is no substitute for much data that are available in technical books, in proceedings of professional societies and through the work of trained investigators. The yearly issues of the *Industrial Arts Index, Chemical Abstracts* and similar publications are a constant reminder of the value of investigation.

1. Cutting Handling Costs

Handling methods for incoming supplies should be examined by the progressive bakery to make sure that more economical procedure is not possible. Belt and roller conveyors, chutes and lift trucks can be used to cut handling costs. Incoming raw materials should move steadily—without backtracking if at all possible—from point of delivery to point of use. It is possible by automatic tripping devices to send bags and cartons to any selected delivery point. Chutes should discharge at shoulder height if bags are to be handled by laborers. The possible use, in combination, of central storage, conveyors and electric lift trucks should be investigated.

2. Pointers on Fuel, Power

Many bakeries have a substantial fuel and power bill. A recording steam-flow meter, draft gages, a CO_2 recorder and a thermometer for measuring stack temperatures usually will pay for themselves in less than three years. With such instruments, a reduction of 10 to 20 percent in the cost of fuel for heating and for process steam frequently is possible. The easiest way to cut fuel costs is to burn a nonpremium fuel. Low CO_2 readings and excess stack temperatures show wasted fuel, whatever its grade. The instruments listed will permit determination of boiler efficiencies and initiation of steps to get maximum efficiencies.

The steam-flow meter also is desirable as a means of analyzing steam and power requirements in order to determine the economic possibilities of making steam at 200 lb. or so pressure and passing it through a bleeding, condensing turbine to make power. Steam for process or heating can be bled at any desirable pressure, such as 10 lb., and any small amount of steam left over can be condensed. Where the total power bill and the cost per kilowatt-hour are high, the scheme outlined often is the cheapest overall way of providing steam and power.

When a bakery has such a power plant, it will have to have, in some cities, a licensed engineer to run it. This engineer will be competent to keep the ovens operating on low-grade fuel oil such as No. 5. Thus some bakeries will be able to reduce the cost of fuel for their ovens at the same time they reduce the cost of power.

CO_2 recorders on the ovens also are desirable for determining whether fuel is burned efficiently. Some bakers burning oil or gas trust to their eyes in determining by proper flame color the amount of air needed for complete combustion. Excess air in combustion, however, means wasted fuel. Close regulation of excess air by color of flame is not possible, and the only satisfactory check is the determination of the amount of CO_2 in the oven gases. Bakeries burning No. 3 oil could shift to No. 5 at considerable saving and burn it more efficiently with the help of CO_2 recorders and a licensed engineer.

The recording steam-flow meter has another advantage in that it is the first step necessary in good cost accounting. Orifice plates can be placed in pipe lines supplying steam to the ovens and used with the recording steam-flow meter to determine consumption of steam for the various operations. Then, knowing the total production of steam, it is possible to set up approximate breakdown figures showing how much steam is used by each oven and how much for heating the building. Instead of fuel costs being carried as an overhead item, each product then can be charged with the cost of steam used. Some simple readings will determine power consumptions similarly.

3. Figures Are Revealing

A cost-accounting system is needed by every bakery. This system need not be elaborate. Many charges can be reduced to standard factors that will be close enough. All items of direct labor; raw material; steam; power; depreciation and maintenance charges on equipment; cost of floor space occupied by equipment, including charges for real estate taxes, building depreciation and heat; and similar cost items should be determined for each product. General overhead in many bakeries includes items of cost that actually could be broken down approximately to apply to each product. Then the bakery management will discover actual costs of each product and can push the sale of the more profitable items. Most bakery managements are astonished with the results of their first accurate cost-accounting statement.

4. Insurance Policy

The item of fire-insurance cost should be examined by the progressive bakery. Too many bakeries are carrying inadequate fire insurance, or are paying more than is necessary for what they carry because they have not placed their buildings in proper condition to get the low rates that are possible. Some of the big bakeries are insured at net rates as low as 4 or 5 cents per $100 of valuation. Such insurance gives them an edge in competition. In time of business depression, the annual charges they have to meet to stay in business are less than the average, as they have revamped their buildings to eliminate objectionable fire hazards. The expenditures required to place a bakery in proper condition for low-rate insurance often can be paid for in five years or less from savings in premiums.

As soon as a bakery has low rates for its fire insurance, it can carry adequate insurance on its inventory, loss of occupancy, civil commotion and riot and similar items involved in full insurance coverage. Analysis of insurance cost in a bakery often will show inadequate coverage merely because the total cost of full coverage is too high. This condition should be borne in mind in determining how much may reasonably be spent to remove fire hazards.

Harris & Ewing

Overhead cooling racks on which loaves hot from oven swing gently back and forth for two hours to permit gradual cooling. Developing improved methods like this will be necessary to meet competition in the period ahead.

5. Pamper Equipment

Preventive maintenance is as desirable in a bakery as in any other manufacturing plant. The master mechanic and his assistants should be required to go over all equipment for cleaning, oiling and correction of defects according to a schedule showing just what items are to be checked. Proper types of oil and grease should be used. Instructions should be so definite that there is no conflict in work between the master mechanic and the foreman of the cleaning gang.

6. Clean by Machine

Mechanical equipment is cheaper than the old-fashioned mop and pail in washing floors and walls at regular intervals. Vacuum cleaning with large enough collection tanks and adequate vacuum is better than brooms that stir up the dust instead of removing it.

7. Make Vermin Vamoose

Complete elimination of all vermin in a bakery is not easy, but they can be kept to a minimum by a vigilant staff. More stringent standards of cleanliness after the war can be anticipated by all the food industries—including bakeries—and preparation for them should be made.

8. A Nice Place to Work

A bakery should be a pleasant place in which to work. Employees should have adequate washrooms and good toilet facilities. A room in which to lounge and smoke when not on duty should be provided.

Plenty of clean work clothes will increase the self-respect of the workers and make an excellent impression on the inspecting public. These suggestions also will reduce the excessive turnover in personnel from which many bakeries are suffering.

Forced ventilation at particularly hot spots might well be provided, as in the steel industry. Workmen should be as comfortable as possible.

9. Show Off Your Plant

The progressive bakery might well invite inspection of its operations. In the meat, brewing, whiskey and sugar industries are companies that, before the war, welcomed visitors on regular daily tours of inspection. Competent guides conducted these tours and explained operations. A well-run, clean bakery with employees in clean uniforms could develop considerable good will by a similar procedure.

There is no better way of getting public support than to take groups of school children and women's clubs through a bakery. Show people how good commercial products are made under better and cleaner working conditions than exist in their own homes. Costs will come down through lower turnover of employees, and sales will be increased.

10. Junk the Junk

Junk, old steel and odds and ends of crates lying about a bakery should be removed. Successful machinery manufacturers are critical of holding second-hand stuff more than a year. The same standard will in the end save money for the bakery. Waste in rehandling stored material is greater than usually is recognized. Storage racks should be provided, of course, for steel rods, pipe and similar material for which use in a reasonable time can be anticipated. Junk accumulations under benches are not to be tolerated. Good housekeeping frequently is a sign of low-cost production.

11. Keep Inventories Low

Bakeries have been so hard pressed in recent years to get raw material needed for their products that they have forgotten the importance of adequate inventory controls. The successful bakery keeps its inventory as low as possible, after allowance for time of delivery, and makes sure that all material purchased finds its way into the storeroom. Relatively simple controls will protect the bakery against waste, theft and excess supplies.

Increased mechanization gives any plant the advantage of lower costs. Here is a modern pie making plant that has that advantage.

12. Do More With Less Work

Packaging in cartons is done extensively in bakeries making pies, muffins, cakes and similar products. Here is a chance to reduce costs by economy of motion. Packing tables, stools, empty boxes and hand trucks should be arranged so that the packer's movements are reduced to standard minima. The baking industry may well take a cue here from methods used in assembling electrical merchandise.

Where there is a large volume of express and parcel-post shipments, it is possible—by means of roller conveyors, an automatic sealer and a properly arranged working table—to make one packer do the work of four along the usual wasteful lines. In addressing shipments, stencils can be used if the order department has a stencil-cutting machine and a filing cabinet for stencils. Each bakery will have many repeat customers where a stencil can be used over and over again if it is sent to the shipping department with the corresponding order. Stencils should be returned each day to the filing cabinet in the order department.

13. Shave Distribution Costs

Trucking costs should be analyzed to determine the limits of economical haul and the need for distribution depots. Several comparative statements of capital and operating costs will show rather quickly the approximate economic number of distribution depots.

The operating costs of the trucks also ought to be studied. A cost system should be established to make certain that the trucks are operated efficiently. Operating on a maintenance schedule that anticipates repairs usually is much cheaper than waiting until breakdowns occur. Hours wasted by drivers should be known. Prizes should be awarded for safe and economical operation. The bakery with a hundred or more trucks should be as vigilant in their operation as a large interstate trucking corporation. Painting of trucks for beauty and cleanliness is desirable on a definite schedule in order to enhance the reputation of the bakery.

14. Better Quality, Better Price

The market for quality products should be explored further. A number of bakeries are getting relatively high prices for better products where taste is an important factor. This statement is as true of bread as it is of cake, pies and muffins. A quality product once established shows a much better margin of profit than the inferior product, where competition often is more severe. The quality product is being sold by advertising at points as distant as 24 to 48 hours by express shipment. If a private club can send its mince pies across the country at Christmas, then the bakery should be able to develop a similar sale for some items.

15. Research for Profit

Research is as important to a bakery as to a chemical company. The bakery that is successful will have some talented individual con-

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HIRING VETERANS — Common-Sense Plan That Works

From a study which began when its first employees left for the armed forces, Curtiss Candy Co. has developed a well-integrated program for putting veterans on jobs they like and can handle. There are pointers here for others

By MARIJEAN HUTCHISON, Editorial Assistant of "Food Industries," Chicago

INDUSTRY is facing the problem of effectively absorbing a substantial portion of the discharged veterans. At present, the problem of absorbing these returnees while production is decreasing does not enter into the picture as far as the food industry is concerned. The potential demand for food for the next several years indicates that production is likely to stay at a high level, or even increase, for two or three years as labor, ingredient materials and equipment again become available.

Nevertheless, some food companies have been preparing reemployment programs ever since Selective Service was put into force. As a result, they now are able to fit the returned veterans into their organizations without displacing the wartime employees who have conscientiously and effectively applied themselves.

An example of a well-integrated plan for returned workers, now in operation in the food industry, is found at the Curtiss Candy Co., Chicago. Under this company's veteran reemployment and rehabilitation program, 130 service men and women had been rehired at the time that this was written. More than half of these were former company employees—over a thousand Curtiss workers had entered military service.

Plan Is Set Up

In developing the plan, personnel, factory, sales and executive departments got together to work out ways and means for the assimilation of the men and women returning from the armed forces. Personnel files were set up by departments and units to give interviewers all pertinent information about old employees as quickly as possible. Departmental canvasses were made to determine how many service men and women could be absorbed, how quickly, and into what positions.

Jobs for Handicapped

To determine which jobs can be filled by handicapped veterans, job-description surveys were made and methods established to measure new skills and experience that may have been acquired. On the whole, the placements must have been right, because the returnees seem satisfied with their old jobs irrespective of what they have been doing while a part of the armed services.

In preparation for handling the handicapped veterans, Curtiss experimented for several months with deaf mutes, epileptics, spastics and blind people to determine whether or not they could be used and what adjustments in machinery and the like would be necessary. Because of the nature of the equipment, the company found that blind people cannot be satisfactorily utilized, nor can epileptics. But deaf mutes and spastics usually work out satisfactorily on certain types of equipment—such as that used for materials handling and packaging, where the chance of physical injury is negligible.

Curtiss Candy Co.'s "gone to war" flag (foreground) and its "returned veteran" employment flag. At the time the picture was taken, 1,080 of its workers had entered the armed services and 130 had returned to jobs with the company.

World War I Vets Help

While this personnel machinery was being geared up, interviewers and consultants were being trained by the personnel department to cope with the veterans' problems. Interviewers, many of whom are World War I veterans, were picked from the personnel of units within the plant. They qualify for the assignment in that they have the ability to understand the viewpoints of other people and get along with other people. Courses in interviewing and advanced personnel work have been taken by these interviewers in various schools throughout the city, and the company itself is conducting a course in human relations for them.

Factors taken into consideration by the interviewers are: (1) Whether the returned veteran wants his old job back; (2) whether he has become qualified during his military service for work requiring higher skill or training; (3) whether he has some disability which might impair his ability to resume his old job.

The working efficiency of this plan already has been demonstrated in the case of a former accountant

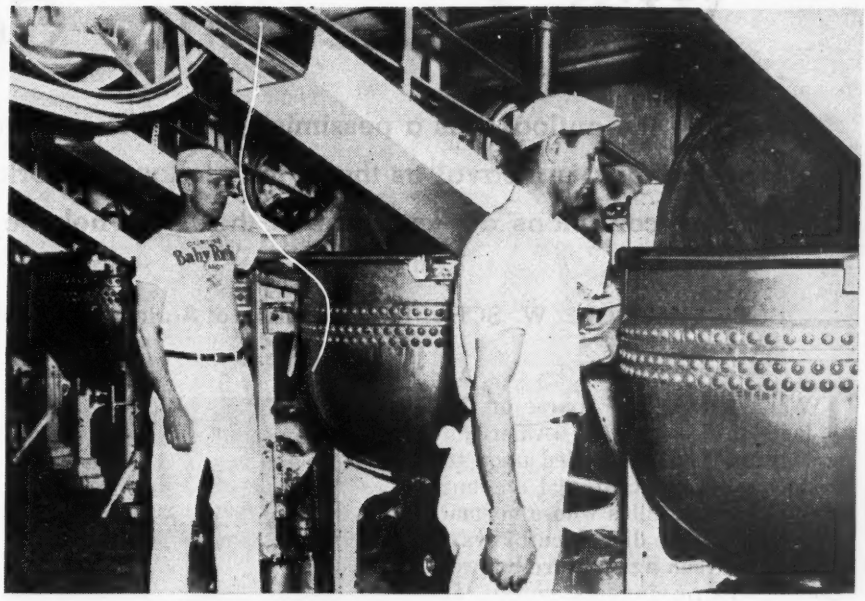
with Curtiss. This man stepped immediately into his old job, and within a short time had advanced considerably. The other employees hardly realize he ever has been away from the company.

Another veteran, not a former Curtiss employee, has been in service in the Pacific for three years. Since he was in the supply service, his responsibility was to get ammunition up to the front lines and he was really under fire quite a bit of the time. When he applied to Curtiss Candy Co. for work, the personnel department found him best qualified for traffic work. He was given the opportunity for about a year's training in traffic and shipping procedures to see how readily he could adjust himself. So far he is working out splendidly.

The plan has sufficient flexibility to accommodate those veterans who want to go back to their old jobs. This type of veteran seems primarily to include those who previously had been in sales work and have ideas of going into business for themselves.

A helpful factor in the Curtiss plan is that World War I veterans have voluntarily offered the returning GI whatever help and understanding viewpoint he may need in getting himself adjusted. As each former employee returns, he is given an opportunity to see and talk to his former fellow workers. In this way he gets to feel "at home" before he discusses details of reemployment with members of the personnel department. The personnel department finds that the veteran needs to be satisfied in his own mind that he has been given his old job or a job of equal or better rating. This assurance is a factor of utmost importance. Another important factor is that many of the returnees have gone to school while in service and are well equipped to do many and varied jobs.

Veterans who have not previously been employed by the company receive the same treatment and consideration as do former company workers. If the interviewer thinks that the company does not offer the right opportunity for the veteran's personality and background, he may refer him to the personnel departments of other organizations or to vocational-guidance centers for further consultation. The returnee's wishes and interests are determined through personal interviews, not by written forms and tests.



Veterans may return to jobs such as "cooking the batch," which involves some manual labor as well as operation of the mechanical devices on the cooking kettles.

One discharged veteran didn't seem to know what he wanted to do and could get up no enthusiasm over any job. The Curtiss interviewer suggested he take an aptitude test at one of the recognized organizations that give such tests. This revealed that he was best suited to go into business for himself. Encouraged by this discovery, he entered into his business with conviction, as well as enthusiasm, and within a short time had made real progress.

Besides operating several candy and other food plants in Chicago, Curtiss has a large national sales organization and 10,000 acres of farmland around Chicago. On this farm, acreage experiments are being conducted in improvement of quality of agricultural products, soil fertilization, soil conversion, cattle breeding, milk production, development of better poultry products, and the like. All these diversified activities offer opportunities for employment and the apprentice training of physically handicapped veterans.

So far, quite a few of the returned veterans want to continue their education, but usually on a part-time basis. Their first desire is to obtain and hold a good job. This plan provides for the fulfillment of that desire. It also provides that special care be taken, in the case of the handicapped veteran, to see that necessary hospitalization is continued and that working conditions do not aggravate his disability.

This plan of the Curtiss Candy Co. fits in between the two extremes of *"laissez-faire"* and "red tape, approvals, and complicated forms."

Can Be Overdone

Some organizations feel that "the fuss and bother" over the returned veteran can be overdone. One executive summed up his company's policy in this way: If one can get the supervisors to handle the ordinary personnel problems in an effective manner, on a common-sense man-to-man basis, the problem is 99 percent solved. In his company, not much stress is put on the "problem" side of the veteran. The veteran is absorbed naturally and without any fuss, just as though he were a civilian who had been working elsewhere during this war period. If particular attention is focused on the employees who have been away, that attention seems to make them more ill at ease.

One returned veteran gave expression to thoughts attributed to many returnees when he said: "We want to come back just as if we were good friends who have been away for a short time."

A recent report from the national employment committee of the American Legion states:

"The proper placement of the physically handicapped—matching their physical capacities and physical demands of the job as determined by a proper job analysis—will present no problem to industry, and such properly placed veterans will render satisfactory service."

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Will Agriculture Collapse?

While the outlook has a pessimistic undertone, the author foresees no such agricultural upheaval as that which followed World War I, provided some of the conditions are maintained that now help to stabilize the industry*

By THEODORE W. SCHULTZ†, Professor of Agricultural Economics, University of Chicago

TWICE during the course of the last three decades, American agriculture has been called upon to produce a large, additional amount of food for our allies whose normal supply lines were disrupted by war. Twice American agriculture has responded, increasing its output of food 11 percent during World War I, and 30 percent in World War II. Both then and now, agriculture has prospered while the wartime demands lasted. Will this parallelism between the two wars also assert itself after this war in an agricultural collapse? After World War I, when the supply line of our allies for food had been restored, the demand for American food dropped and agriculture experienced a depression from which it had not fully recovered when World War II was thrust upon us. Are we likely to have a repetition on the agricultural front of the twenties and thirties? Will this nation again find it necessary to undertake farm relief, measures to stave off disastrously low farm prices—production control, price supports and subsidies?

THEODORE W. SCHULTZ

Agricultural Production

Let me touch briefly on what has happened in production. In the aggregate it has been expanded by one-fourth, for food by about one-third. During the first war, our efforts were focused on the "battle for wheat." This time it has been on oil crops, on livestock and its products and, to a much less extent, on wheat. Yet there has been considerable change on the crop side. The "big three" in our agriculture are corn, wheat and cotton. Corn has expanded from 86 to 97,000,000 acres, with a record crop of 3,200,000,000 bu. last year. Wheat has increased from 49 to 59,000,000 acres, nearly all of the increase coming in 1944, and the unprecedented crop of 1,100,000,000 bu. Meanwhile, cotton has declined from 24 to 20,000,000 acres. Soybeans have been doubled. Flaxseed and peanuts also have been increased markedly. The expansions in livestock products have been much larger than those in the main crops. Large carryovers of corn and wheat, along with imports, made this possible. Our production of meat last year was 50 percent greater than it was before the war. Eggs and chickens also have been increased by one-half. Lard was up about 85 percent. One of the few things that is down is butter, chiefly as a result of more milk being used for human consumption. There also have been important shifts among crops.

World War II made great inroads into our wheat granaries, although we are again on the way to accumulating stocks. But even the war has not liquidated our excessive stocks of cotton. We still have a carryover of upwards of 11,000,000 bales.

One of the more significant developments is the decline that has occurred in the farm population, which has dropped from about 30 to 25,000,000 people as a consequence of the mobilization for war. This transfer of people has increased greatly the relative scarcity of the labor supply in agriculture. It is, by all odds, the most important wartime development affecting agriculture.

Then there is the marked improvement that has occurred in the capital position of farm people, which is A-1 for the first time in three decades. When we add all of the items in the farmer's financial balance sheet, including real estate, other physical goods, and intangibles, we find that it has risen from $54 to $83,000,000,000 since 1940. This means in substance that the equity of the owners of farm land and the farm tenants has increased by $30,000,000,000.

The Outlook

The outlook has a definitely pessimistic undertone. The gist of it is as follows:

1. Agriculture will stay in full production after the war regardless of the performance of business or the level of foreign trade. Agriculture can be induced to expand its production, as has been done during both world wars. But it is essentially a one-way street. We have found that it is not only costly and difficult, but virtually impossible, to bring about a contraction in the short run—for that matter, even during a decade or longer. The import of this is obvious. We are going to have a much larger volume of farm products than we had before the war.

2. The demand for farm products is likely to drop sharply as soon as the relief period is over and our granaries have been refilled. My guess is we will find our granaries bulging within two years after the war. The demand for food will contract. Even if we attain and maintain full employment and relatively free and open trade with

*Although written before the war ended, the author's comments still are valid. —The Editors.

†Member, United Nations Food Commission; Member, Committee for Economic Development.

other countries, it will drop far below the levels of 1944.

3. Chronic agricultural surpluses are likely to put in their appearance within two to five years after the war. Sugar, and even fats and oils, may become much scarcer before they are abundant again. Cotton, on the other hand, is already decidedly surplus. Wheat surpluses, too, may be just around the corner.

4. Despite the commitments authorized by Congress to support farm prices for two years after the war, they are likely to drop sharply in dollars and cents and decline markedly relative to other prices as we make the transition to a peacetime economy. Prices received by farmers have doubled since 1939. They have increased substantially more than have nonagricultural-commodity prices. Under existing legislation, the government is not prepared to make its program of support prices effective. There are, therefore, no convincing reasons for believing that farm prices will settle or be maintained at a level which is substantially higher relative to other prices than they were prewar. Even at that level, the enlarged agricultural production may not clear the markets.

5. The terms of exchange available to farm people (namely, the relationship of prices received and prices paid by farmers) are likely to drop from one-fourth to one-third from the levels of 1944. To translate this into parity, it means a drop from a parity of about 115 to a parity somewhere between 80 and 90.

6. The proportion of the working population engaged in farming will be smaller after the war than it was in 1939. It has dropped from 20 to 15 percent as a consequence of the mobilization for war. Herein lies a real gain for agriculture, for it means that the relative earnings per worker engaged in farming will be better than they would be under the prewar distribution of the nation's labor force.

The postwar agricultural outlook, accordingly, adds up to this: A year or two from now, agricultural prices will recede from the price ceilings that have held them in check. In their fall, many of them are likely to break through the price floors that have been established by the government. Although the drop will not be as precipitous or great as that which occurred following World War I, it will be sufficient to cause a widespread, serious, depression in agriculture. On two counts, however, American farmers may well be in a better position to withstand low prices and low incomes for a time, certainly better than they were in 1920-1921. In the first place, the farm population is down one-sixth, the number of farms perhaps one-tenth, and the efficiency per worker is up sharply. These conditions are based on the provision that workers who left the farm during the war do not return, and further, that we do not embark on a program of settling large numbers of returning soldiers on farms. In the second place, farmers are in a stronger financial position. But here, too, we must say: Provided this gain is not dissipated in a further bidding up of land values.

So my answer to the question this article raises is: We are not likely to experience an agricultural collapse in the manner of 1920-1921, but we will probably suffer a serious agricultural depression within two years.

The Depression

The next question might well be: How long is this postwar agricultural depression likely to last? From what we have already said, it should be evident that wars have caused farm prices and income to rise and fall sharply and production to increase substantially. Business fluctuations differ in that they are the main cause for the instability of farm income. Agricultural production is remarkably steady from year to year, regardless of the performance of business, whether it booms or is depressed. But farm prices quickly reflect changes in business conditions, and as a consequence farm incomes have become exceedingly vulnerable to business fluctuations.

Let us inquire into the position of agriculture as a supplier of farm products, both for food and industrial uses in a developing economy.

The most significant fact that emerges from the analysis which I am about to present is the unequal growth which has come to characterize the demand and supply of farm products. The prospect is that for the next decade or two the supply of farm products will be ahead. It will increase more rapidly than the demand.

Varying Demand?

The nightmare of overpopulation that oppressed the older economists, Malthus and his contemporaries 150 years ago, no longer troubles our minds. Even as recently as 1870-1880 our population increased 26 percent during the decade, while during the decade preceding 1940 it increased only 7.5 percent. Europe, once a considerable market for American farm products, is confronted with a similar population change. The projected increase for the decade 1950-60 for all of Europe, exclusive of Russia, is only 1.5 percent, and in western and northern Europe the population is likely to decline.

The second important variable in the demand for farm products is the level of income. In the years between the two wars, income per head in the United States fluctuated widely, but there was no appreciable gain. The war has given us a marked increase. Conservative estimates of Simon Kuznets put the rise in income for 1939 to 1944 at about 40 percent per

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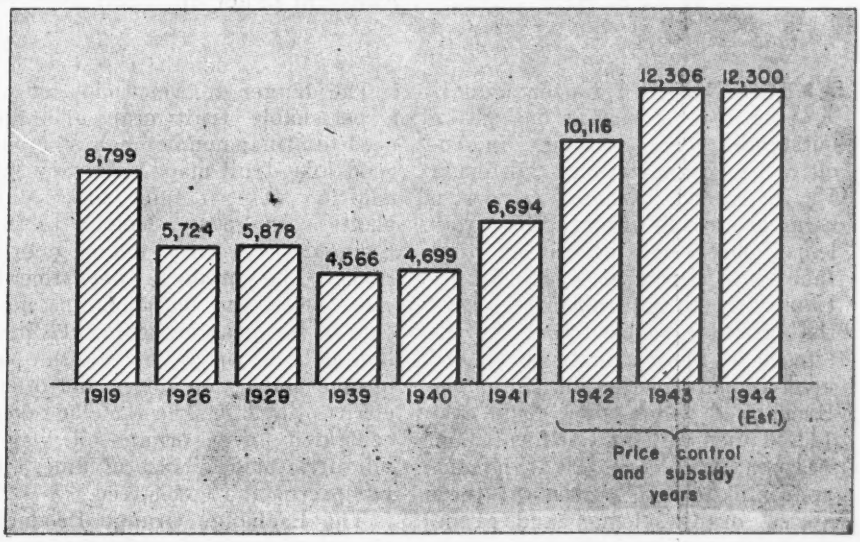


Farm net income, in millions of dollars from 1919 to 1944. (From OPA report to Congress.)

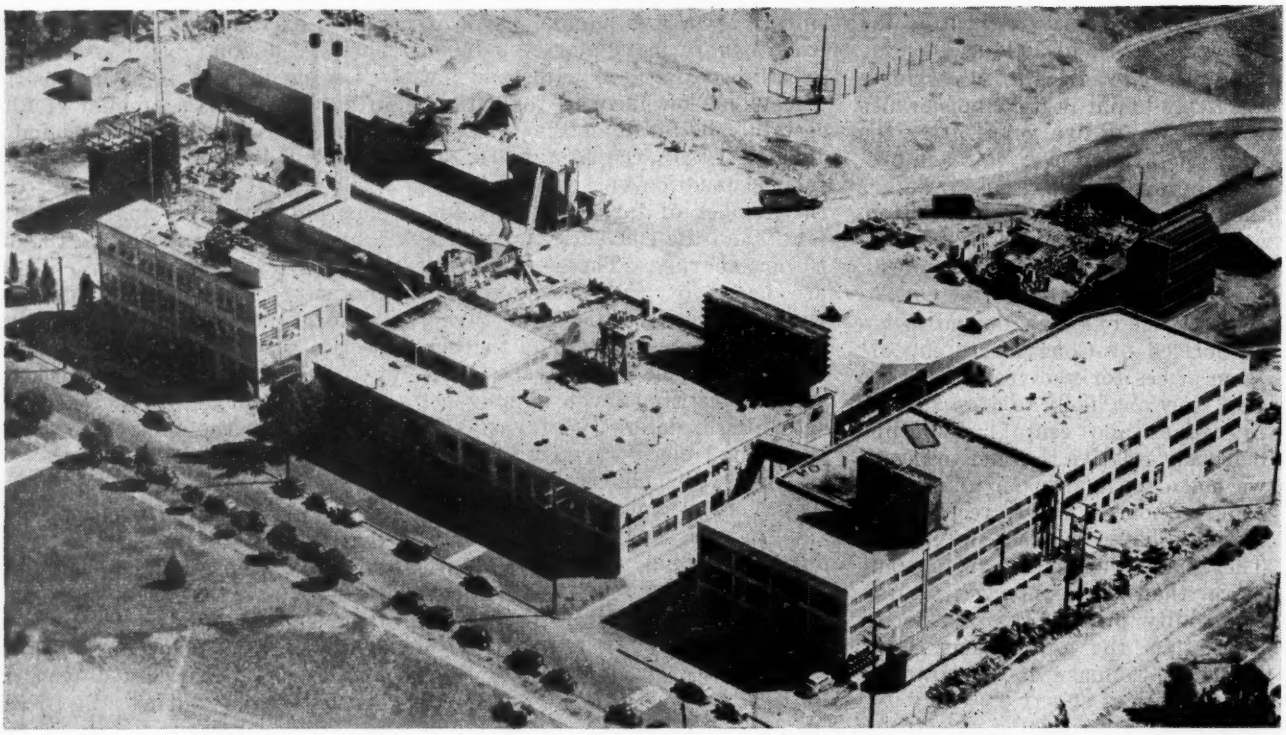


FIG. 1. Exchange Orange Products Co. at Ontario, Calif. At this affiliate of California Fruit Growers Exchange, oranges that are below fresh-fruit standards, or are in surplus, are manufactured into products such as concentrates, oils, pectin and stock feed.

How Orange Products Are Made From Juice, Pulp and Peel

Canned juice, pectin, oil and stock feed worth $7.6 million in year are produced from Sunkist fruit that can't be sold fresh. The score or more of unit operations involved will suggest new technics to many in other lines

By C. R. HAVIGHORST, Assistant Editor of "Food Industries," San Francisco, Calif.

RECOGNIZED for over a quarter of a century as one of the outstanding achievements in cooperative organization, California Fruit Growers Exchange came into being as a result of marketing problems and other difficulties that faced the citrus growers. So serious were these problems in 1893 that growers realized that the existence of their industry depended upon cooperative action. Thus the Exchange, which now lists over 14,200 members in California and Arizona, was formed. It handles approximately 75 percent of these states' orange, lemon and grapefruit crops.

The danger of overproduction of a perishable fruit crop and the need to utilize nonmerchantable but good juice-fruit made necessary the addition of two juice processing plants (orange and lemon) to the Exchange's growing list of operations. The products department, sales office for both plants, now does a business exceeding 11 million dollars yearly in the sale of orange and lemon juices and other citrus products. These include concentrated juices, orange oil, lemon oil, citric acid, citrate of lime, citrus pectin and stock feed.

The Exchange Orange Products Co. plant (see flowsheet) has a planned capacity of 700 tons of fresh oranges per day, but the available raw material supply fluctuates with weather conditions, fruit prices and other factors. The annual utilization of oranges by this plant will average 75,000 tons. Starting as a small marmalade plant a quarter of a century ago, with $12,000 in sales during its first year of operation, this plant processed more than one-fifth of the 3,800,000 gal. of concentrated orange juice purchased by the government during the year ending October, 1943. Total sales, including all orange products, exceeded $7,600,000 for 1943.

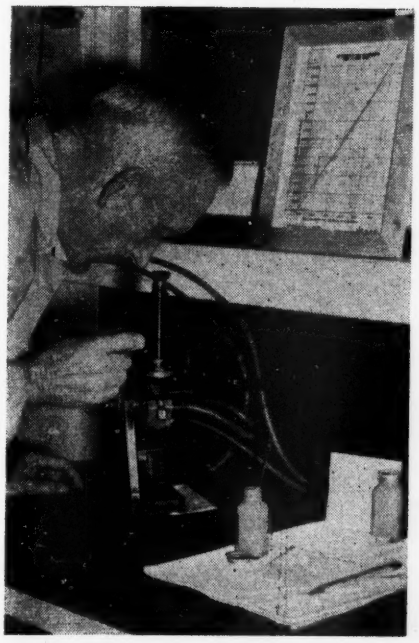


FIG. 3. Determining the Brix of each lot of juice with a refractometer. The juice is also titrated to secure an accurate and practical analysis of its quality.

A year-around growing season provides the plant with a fairly continuous supply of raw material. The two varieties of oranges grown in these regions are the Washington Navel, harvested from November to May, and the Valencia, harvested from April to November. Because the juice of the Navel takes on a slight grapefruit flavor during the canning process, it is less desirable than juice from the Valencia. But both are processed for various uses.

Processing Operations

Large duplex trucks with hinged sides to facilitate unloading (Fig. 2), bring 10- to 17-ton loads of fruit to the plant. This supply comes from the Sunkist fresh-fruit packing plants, where it has been graded-out as juice fruit. Any fruit damaged in transit, or containing decay spots missed at the packing house, is picked out as it is carried to storage bins on slowly moving belts.

In the elevator that takes the fruit to the bins is an automatic sampler. Here a representative sample of each lot is mechanically selected and sent to the laboratory to be analyzed. A refractometer test (Fig. 3) determines the Brix of the juice, and the ratio of sugar to acid also is determined. The fruit is inspected for percentage of decay, and a sample is reamed for juice. This juice is strained and weighed so that the yield per ton of fruit may be computed. Growers are paid on the basis of these tests.

From the bins the fruit is elevated to washers (Fig. 4) on the second floor. There it is first immersed and agitated in soapy water in the lower part of the washer, then elevated to the upper part, where all residual dirt is scrubbed from the skins by brushers revolving in clear water.

Heavy-pulp Line

The fruit is divided into two grades at the receiving platform. The best grade is designated for the juicers, or reamers, and the fruit that requires further inspection and paring of bruises and other imperfections is routed to the heavy-pulp line. The juice manufactured from this fruit is used for still and carbonated orange drinks.

In the past, concentrated juice intended for use in carbonated beverages was filtered or clarified so that the beverage would remain clear. Cloudy juice would clear itself in time, the insolubles settling as an unsightly sediment. Now, through a controlled process of high-temperature flash pasteurization in stainless steel equipment, the juice is freed of the adverse effects of fermentive organisms and also of clarifying pectin enzymes. As a result, storage life, at reasonable temperature, has become satisfactory.

After the heavy-pulp fruit has

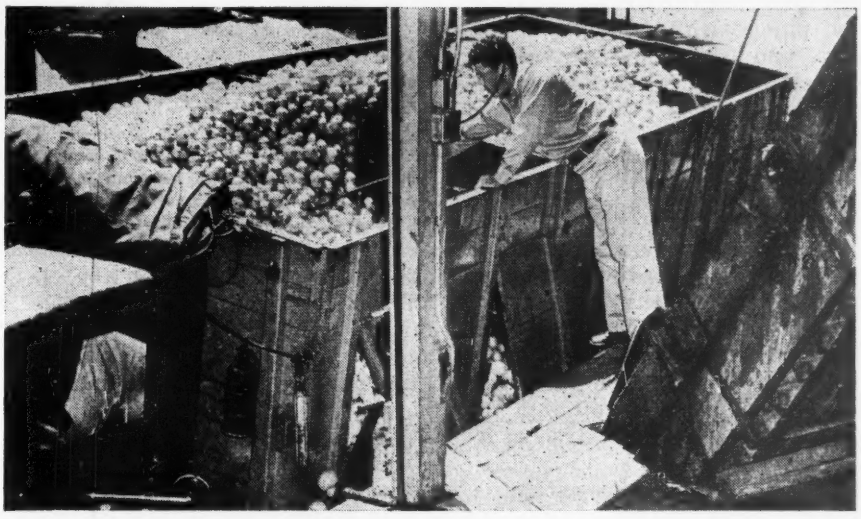


FIG. 2. Unloading oranges for processing. As much as 100,000 tons of surplus juice-grade oranges is manufactured into products annually at this plant, which has a capacity of 700 tons of oranges per day.

FIG. 4. Oranges are washed in a soap-and-water bath, then elevated to the upper part of the washer to be rinsed free of soap by warm and cold sprays.

been washed, it is conveyed to trimming conveyors, where imperfections are removed. Then it is given a final inspection and wash before it enters the pulpers. In these machines, which resemble a screw press, the fruit is forced by a revolving screw through a perforated plate (perforations are 1 to 1½ in.). The juice then is strained and pumped into storage tanks. Extruded pulp is conveyed to the pectin plant.

From the storage tanks, the juice is pumped to "despeckers" (see cover), where any foreign matter is removed with suction pipes. Then the juice is flash-pasteurized at 200 deg. F. and progressively cooled by flowing through pipes surrounded by cold water and then through a bank of refrigerated pipes. It is now pumped into large storage tanks, and 0.2 percent of sodium benzoate usually is added as a preservative. From these storage tanks the juice is either canned or barreled for shipment.

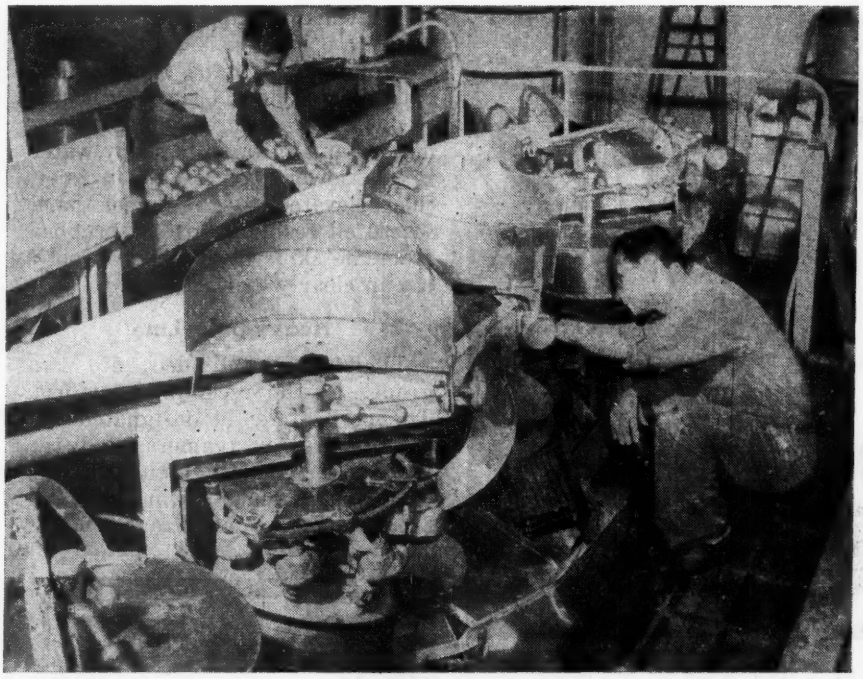


FIG. 5. Brown automatic juice extractors. Fruit feeds into each machine from a conveyor, is automatically cut in half and then picked up by the heavy live-rubber cups, visible in the uncovered portion of machine in foreground. These cups press the orange halves down over revolving reamers, which ream out the juice. Capacity of each machine is 1½ tons of oranges per hour.

Concentrated Juice Line

From the washers, the better grade of fruit is conveyed to either of three types of fruit juicers. Two of these machines crush both fruit and peel for juice extraction. The pressure exerted upon the peel squeezes some orange oil into the juice, and this can be extracted by centrifugal separators.

Only the Brown juice-extraction machine reams the juice from the fruit without crushing the peel (Fig. 5). From a main belt conveyor, the fruit discharges into another conveyor leading to the extractor, dropping into cup-like containers. The fruit is first forced against a stationary knife and cut into halves. Then each half is picked up by live-rubber cups and automatically pressed over reamers which extract the juice.

Conveyed through two channels, oranges are forced against two circular saws for halving in the Fry Citro-Mat machine (Fig. 6). The halves are then impaled on a spiked cylinder which revolves against another cylinder, pressing out the juice.

The extractor shown in Fig. 7 crushes the whole orange. Although the juicing capacity of this machine is high, it does not operate with the same degree of efficiency as the other two.

Juice from these three types of machines is pumped to the seeding machines and pulp strainers. Peel and pulp are conveyed to cold presses that extract the orange oil from the peel.

Seeding machines and pulp strainers operate on a similar principle. The juice is pumped onto a screen which is agitated constantly. The seeds or pulp remain on the screen, while the juice filters through. Screens are cleaned at intervals with steam and water to permit a free flow of juice and keep them sterile.

The juice from the Brown machines, being comparatively clear, is deaerated under approximately 28 in. of vacuum, then pumped into a storage tank to await pasteurization before it is canned. Juice from the other two machines, however, flows to Sharples centrifugal separators (Fig. 8), which remove the orange oil introduced into the juice by the pressing action of the juicing machines. The oil separated out is refined by passing through De Laval separators. Orange oil

FIG. 8. A modified dairy cream separator is used to separate orange oil from the juice. The separators operate at 15,000 r.p.m.

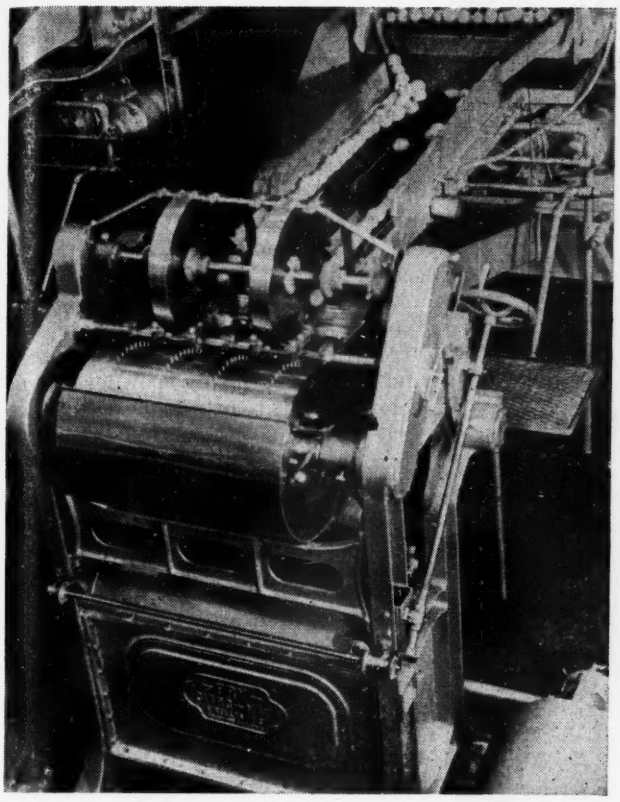


FIG. 6. Fry Citro-Mat juice extractor. Fruit is halved by circular saws, and halves are picked up by spiked-cylinder and crushed between it and another cylinder. Capacity is around 6 tons of fruit per hour.

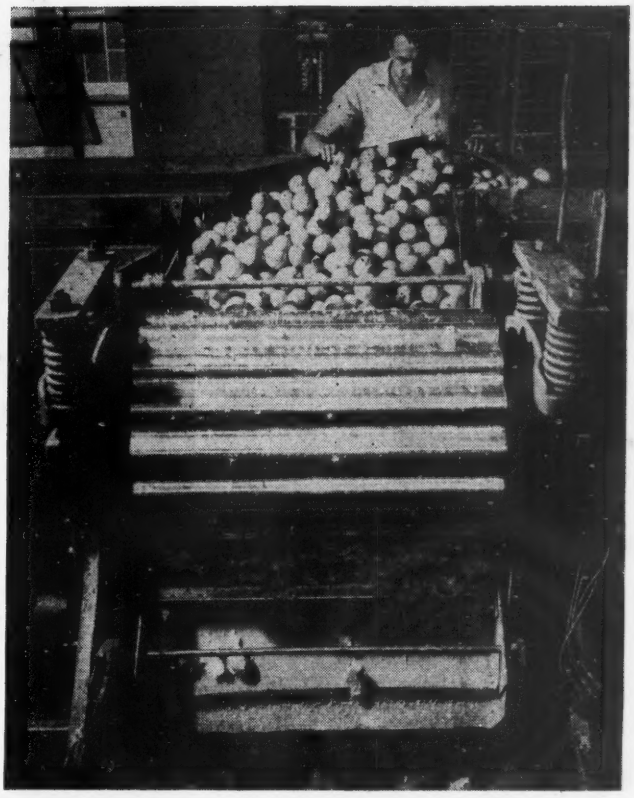


FIG. 7. Crushing oranges for juice. Whole washed oranges are fed by conveyor into this machine, where two large corrugated rollers crush the fruit. The machine will extract 1,000 gal. of juice per hour.

also is obtained by routing whole oranges through abrasive (screen) reels which scrape off the outer peel in which the oil is found. The crude oil is then pressed from this pulp and refined in the separators.

From the Sharples separators, the juice is pumped to vacuum storage tanks, where it is deaerated before being pasteurized and then concentrated in the vacuum pans. The juice is flash pasteurized at 190 deg. and pumped into vacuum pans, where it is subjected to a vacuum up to 29 in. at a temperature of approximately 110 deg. F. Fresh California orange juice will average 12 deg. Brix, although some of the late-season fruit has run as high as 17 deg. Brix. The juice is concentrated at a ratio of 7 to 1 and tests 65 deg. Brix. The temperature of the juice coming from the vacuum pans is around 100 deg. F. It is steam heated to 160 deg. F. and then pumped to the canning line.

Pectin Manufacture

Of pectin's many uses, the most familiar is its employment as a jelling agent in preserves and confectionery. It is also used in the treatment of traumatic shock and is a most promising substitute for human plasma—in which case, it does not form a gel if it becomes cold, as does gelatine. Research has now perfected the production and use of pectin so that the United Nations were getting approximately 2,000,000 lb. from California alone for their annual wartime food and pharmaceutical needs.

Exchange Orange Products Co. has a three-story pectin plant to which the pulp and peel are conveyed from the juice plant. After shredding, the raw material is fed into reducing tanks. Paper pulp screenings, hydrochloric acid and dilute pectin liquor are added to the shredded mass. Then the mass is cooked with live steam under agitation, at a temperature of 95 deg. C. for about 45 minutes. After cooking it is dumped into feed tanks. The paper screenings aid in filtering the liquor from the pulp mass in the rotary screening reels, which are located directly below constant-level feed tanks.

Arranged in vertical banks of two, these rotary reels are covered with a 40-mesh stainless steel screen. The macerated pulp is fed first into the upper reel. As this reel revolves, the dilute pectin liquor (at about 5 to 6 deg. Brix) drains through the screen into a trough below. The pulp drops from the end of the reel into a chute, which feeds it to the lower reel. Liquor from the lower reels is used in the initial cooking operation, and the remaining pulp mass, known as "spent pulp," is usually employed as low-grade fertilizer, or discarded.

Dilute pectin liquor from the upper reel flows to a constant-level feed tank where hydrochloric acid is added, and from there is pumped through plate-frame filters. Dicalite and diatomaceous earth are used as filter aids.

From the filters, the liquor is pumped to storage tanks and then to the double-effect, long-tube, vacuum pans where it is concentrated. The first-effect is held at 12 in. of vacuum and the second at 25 in., and the concentrated liquor leaves this unit at about 40 deg. C. and tests about 13 deg. Brix. It is then pumped to storage tanks on the roof and thence to the precipitate tank, which is located on the third floor.

Pectin fiber is precipitated (Fig. 9) in a bath of 70 percent alcohol which previously has been used in the two washing and hardening tanks (precipitators 1 and 3 on flowsheet). The fibrous mass then is dropped from the bottom of this tank into a drain screw where the dilute alcohol is recovered and the

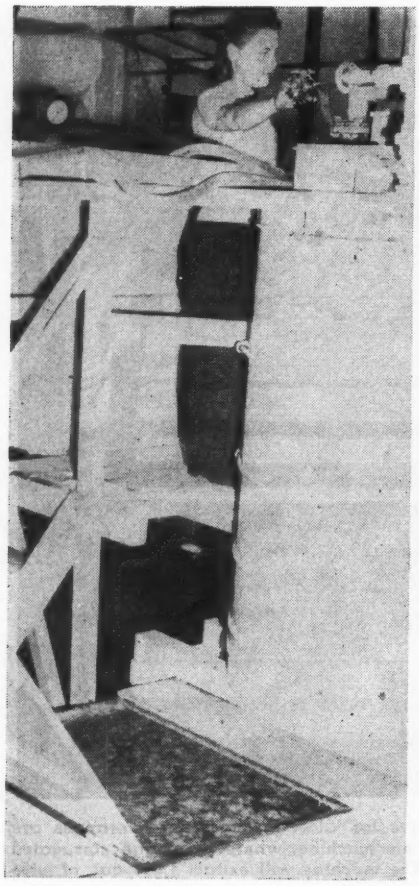


FIG. 9. Concentrated pectin liquor is precipitated with alcohol in this 5,000-gal. tank. The curd-like precipitate is shown directly below the tank (lower foreground).

FIG. 10. Slabs of partially dry pectin, from the continuous press, are wrapped in absorbent cloths and subjected to a pressure of 400 lb. per sq. in. in hydraulic press.

crude pectin is conveyed to the hardening and washing tanks. These two tanks are cloth lined so that the 81 percent alcohol initially used in this operation may be recovered easily for further use in the precipitate tank. Each wash requires about 10 minutes.

From the last tank, the pectin and residual alcohol are dropped to the floor below, where a further recovery of alcohol is made from a rotary reel and from the pectin mass as it is fed through a continuous press. The press cakes, which are now about 75 percent (by weight) of volatile matter, are wrapped in cloths and subjected to a pressure of about 460 p.s.i. in a 40-ton hydraulic press (Fig. 10). Cakes then are shredded and conveyed to a continuous dryer, where the pectin is dehydrated at 180 deg. F. for about 30 minutes. Air from this dryer is carried to a dehumidifier, where additional alcohol is recovered.

From the dryer, the coarse pectin is elevated to a storage bin from which it is fed into hammer mills, the resulting powder being blown into two cyclones. Before packaging, the pectin is sifted through an 80-mesh screen in a Rotex mill. Recovered alcohol is redistilled in a pot still to 100 percent, then piped to a storage tank.

Peel and Pulp Drying

As is shown in the flowsheet, peel and pulp not used for pectin manufacture are conveyed to gas-fired dryers (Fig. 11). There the mass is carefully dehydrated to avoid charring.

The finer particles are carried by the hot blast through the rotating kiln to cyclones and are mixed with the coarser material as it is sacked for stock feed.

This organization now is completing construction of a $400,000 plant for the production of single-strength orange juice. Planned capacity of this plant is 2,000 carloads of fresh fruit annually.

Acknowledgment — The editors wish to acknowledge the assistance and cooperation of H. S. Bailey of the Exchange Orange Products Co. and W. E. Baier of the California Fruit Growers Exchange.

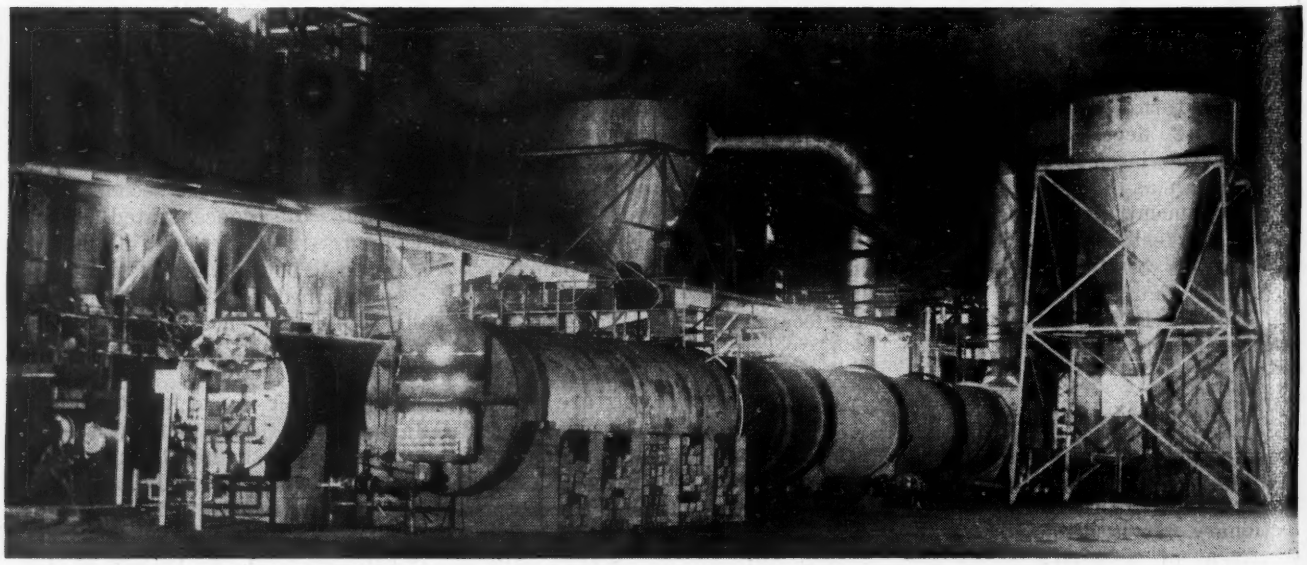
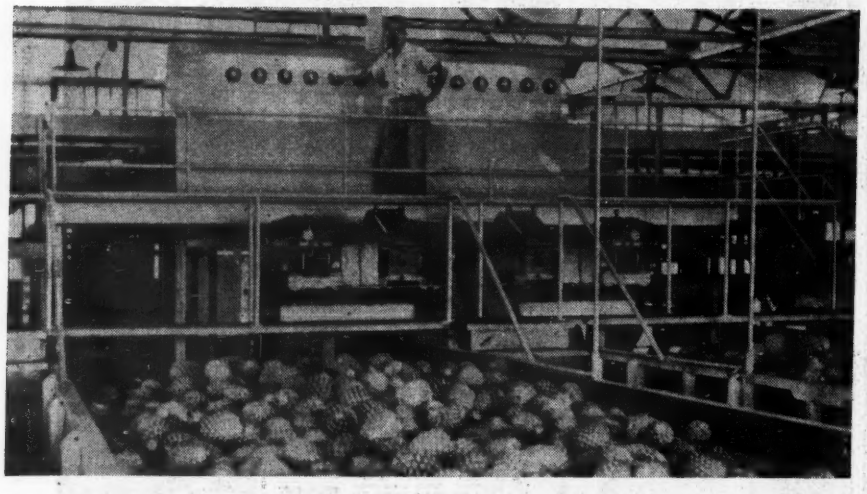


FIG. 11. After juice and orange oil are extracted from the fruit, the remaining pulp is dried in these rotary kilns for use as stock feed. Two kilns produce about 45 tons of feed in 24 hours. The dryers are 70 ft. long, 7 ft. in diameter and rotate at 5 r.p.m.

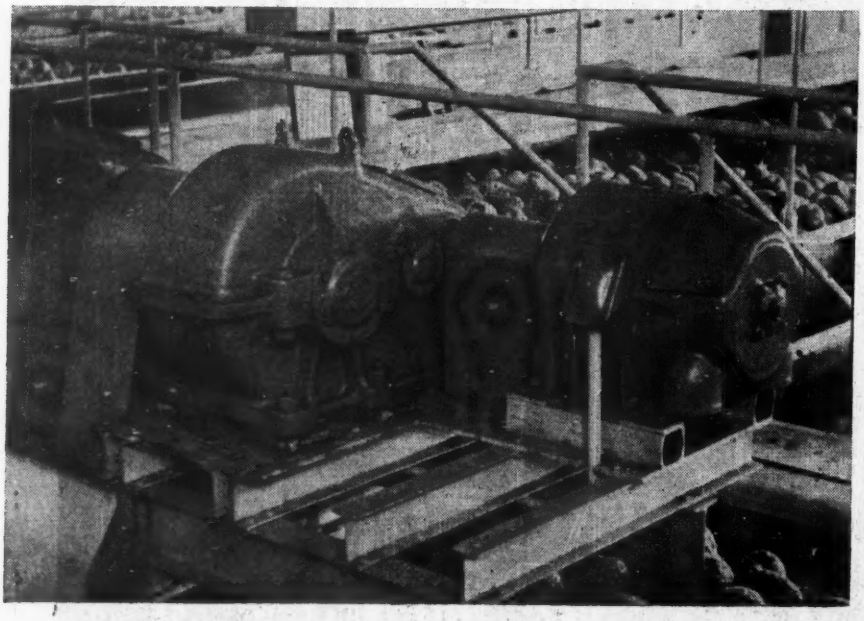
Diagram showing, step by step, the operations involved in concentrating orange juice, making pectin and drying waste.

Remote Control Matches Speed Of Conveyors with Process

Each of 14 conveyors onto which trucks unload at Hawaiian pineapple cannery can be started, stopped or run at any speed from 3 in. to 7½ ft. a minute by man at control station. This assures proper rate of flow of raw material



Rheostat on a central control panel at Maui Pineapple Co.'s plant permit the speed of each feeder conveyor to be regulated so as to fill the main conveyor with the amount of fruit required to meet the process demand. Push buttons on this control panel permit any conveyor to be started when a truck is ready to unload and stopped after the vehicle is emptied. Another set of push buttons starts and stops the motor-generator sets supplying d.c. power to the conveyor motor.



Splashproof motors with a gear speed reducer drive each conveyor line independently. Speed variation is all-electrical. Motor-generator sets convert a.c. to d.c. to permit rheostat control of conveyor motor speed. The speed reducers merely convert the 30 to 1 motor speed range to slow speed at the conveyor. Any conveyor speed from about 3 in to 7½ ft. a minute is attained merely by turning the knob of a rheostat located on a central control panel.

TO speed the processing of its share of the larger wartime pineapple pack, Maui Pineapple Co., Ltd., Hawaii, installed something new in food plant conveyor systems. It is a system of feeder conveyors with dual-control, adjustable-speed, electric drive. Not only has this helped to increase production, but it has reduced costs.

Before this materials-handling equipment was put into operation, the trucks brought the fruit to the cannery in crates. And these containers were individually dumped onto a constant-speed conveyor belt that carried it to the process.

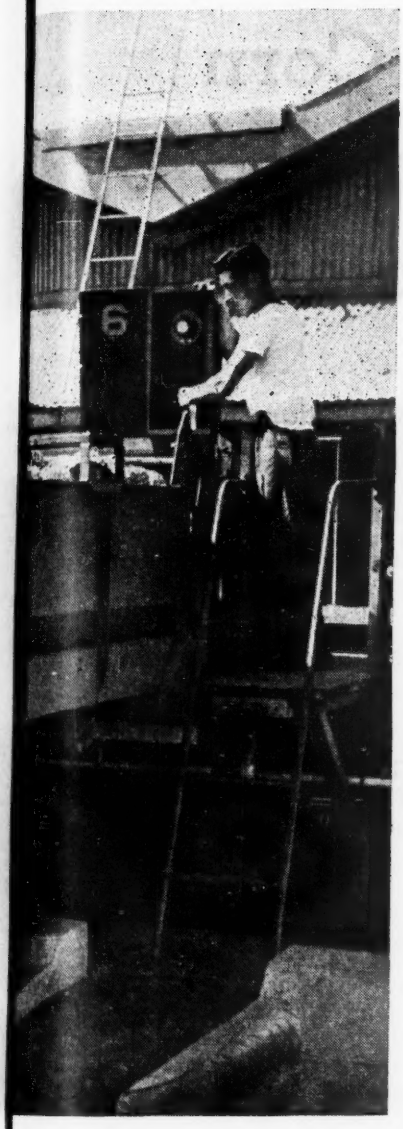
Picking crates represented a major item of cost. While not in themselves expensive, they had to be shipped from the United States, which ran the cost for the containers up to approximately $10,000 each season.

The crate system had other drawbacks, as well. Unloading was a bottleneck, as only a few trucks at a time could be handled at the unloading station. Besides, the flow of fruit to the process was uneven, and the dumping of crates always involved the risk of bruising the fruit.

With the new system, portable conveyors load the specially designed truck bodies in the field, and crates are not used to carry the fruit to the plant.

For unloading at the cannery, 14 feeder conveyors were set up at right angles to a main conveyor. Cement tire guides align the truck with the end of a conveyor as the vehicle backs into the unloading dock. The unloading station is constructed to fit the truck end closely, and a short ramp rolls the fruit easily down to the moving belt.

Inside the plant, on a platform above the feeder conveyors, there is a central station from which the control man operates the 14 Reliance motor-generator sets and the



There are controls at the unloading points as well as at the central control station. This permits the truck driver to move the conveyor along, if necessary, to make room for his load.

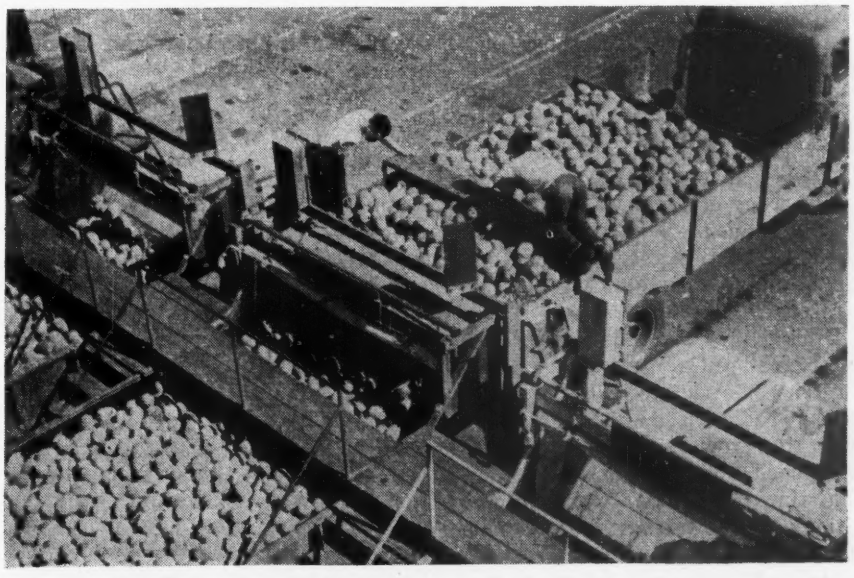
splash-proof motors driving the conveyor belts. Each of these 5-hp. motor-generators is energized from the 440-volt line, and converts the a.c. power into easily controllable d.c. Then by rheostats on the control panel, the output of the power units can be adjusted easily to operate the d.c. motors at any desired point of the 30-to-1 speed range. The motors drive the belts through gear reducers, and the conveyor operating range available through the speed control is ¼ to 7½ ft. per minute.

Central Control

From his control panel the operator may stop and start each of the 14 feeders and run them at any desired speed, independently. By turning rheostats, he is able to maintain a steady flow of fruit to the processing machines as long as there is any kind of truck unloading going on. If unloading stops on one feeder conveyor, he can stop that conveyor immediately to conserve power, then quickly bring one or more of the others up to whatever speed is necessary to keep the main conveyor filled. When the main conveyor is well loaded, all active feeders can be operated at very low speeds, or stopped completely.

In addition to the main controls, there are duplicate individual controls at the dock-end of the feeders, so that the truck driver may move his particular belt along far enough to give him room to clear his load, without waiting for the normal movement of the conveyor. The two sets of conveyor motor controls are interlocked so that both stations cannot operate at the same time.

Here are six of the 14 motor-generator sets which convert a.c. power to controllable d.c. to drive each of the conveyor motors. The d.c. power permits the speed of each conveyor motor to be regulated by turning a rheostat knob on a central control panel. A control also is located at each unloading point.



The trucks back up to the ends of the feeder conveyors to unload. Concrete wheel guides put the truck into the correct position and a ramp drops the fruit onto the conveyor gently enough to avoid bruising.

Maturity of Raw Sweet Corn Determined by Refractometer

With some modification, the refractometer is a valuable time and labor saver in grading raw sweet corn delivered to cannery. Untrained personnel can be taught to use it quickly, and it gives reproducible results

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An instrument with prisms of small range and large areas and a specially constructed telescope optical system is required. Also needed is such auxiliary equipment as will assure uniform and accurately reproducible temperature conditions and correct reading of refractive values.

OF utmost importance in the canning of vegetables is the grading or classifying of raw produce on the basis of those factors which will influence the final quality of the canned product. In sweet corn, the stage of maturity is perhaps the most important single factor governing the final quality of a given variety. For this reason, some method by which the maturity of the green sweet corn can be determined quickly and accurately is necessary.

During the past four years, Minnesota Valley Canning Co. has used a refractometric method of grading raw sweet corn as it is received from the growers. The method has been used not only for a considerable time, but under wartime conditions necessitating, in many instances, the employment of wholly untrained personnel to carry out the grading operation. The method has proved entirely satisfactory for the purpose, and since the necessary optical instruments may become available again in the near future, the details are being published now in the interest of advancing positive control over the quality of canned foods.

During maturation and ripening of corn, there is a continual increase in solids content and a consequent decrease in moisture as the kernels successively pass through the blister, milk, dough and ripening stages. The decrease in moisture content may be used to provide an index of maturity through the application of various types of moisture determinations. These commonly used methods are too well known to warrant further discussion at this time.

While providing a useful index, moisture determinations are slow. Occasionally, the cannery is faced with the problem of either shutting down the plant for a brief period or of canning ungraded corn. In an effort to avoid these alternatives, the details of the refractometer method were worked out.

Details of Method

The actual raw-corn grading is carried out at the receiving platform, a grading laboratory being provided at each cannery. This laboratory consists of a large room (approximately 15 by 20 ft.) in which samples are received and prepared and a smaller and adjoining room (approximately 6 by 7 ft.) containing the refractometer with its auxiliary apparatus. The illumination within the smaller room is somewhat subdued to lessen any eye strain that might result from continual use of the instrument.

Samples are obtained by selecting 30 to 40 lb. of the unhusked corn in the field as each load is picked. Arriving at the scale or at the dump with the load, the sample in its entirety is weighed preliminary to the selection and separate weighing of the ears which are suitable for canning. The suitable ears are husked on a mechanical husker and cut on a Food Machinery Corp. whole-kernel cutter (identical with those in the production department and adjusted by the cutter foreman). After thorough mixing of the cut corn, an aliquot is withdrawn and ground in a motor-driven Universal food chopper having a 3/16-in. plate. The first portion of the sample discharged from the grinder is discarded because it may be contaminated with residues of the last sample ground. Approximately 2 lb. of the ground sample

is collected in a shallow pan and thoroughly mixed with a spoon, after which the sample is ready for grading.

Two persons normally operate the refractometer, dividing between themselves the following operations. Liquid from the ground sample is absorbed by a fairly thin layer of absorbent cotton, care being exercised to take the liquid from various parts of the pan. The cotton is then folded to form a pad in such a way that the surface exposed to the ground corn is on the inside of the pad. The cotton is then squeezed over the filling hole of the refractometer prisms until sufficient liquid has been expressed to fill completely the space between the prisms. After the sample has stood in contact with the prisms long enough to come to the prism temperature, two readings are taken.

After the sample test is completed, the prisms are flushed off with water and dried with facial tissue.

The maturity of the corn is determined from the average of two successive refractive index readings through the use of a calibration chart previously prepared. All determinations must be made at a constant temperature because the index of refraction varies with temperature. A temperature of 25 deg. C. (± 0.5 deg.) is standard because it normally is high enough to be above the dew point, even in humid summer weather. A film of water collecting on the prisms cannot be tolerated; it makes the readings inaccurate.

Calibration Essential

Before the refractometer method can be used for grading, it is necessary to determine the calibration curve for any variety of sweet corn. This is done by determining both refractive index and moisture (or some other index of maturity) on a large number of samples of varying maturity and then relating the two statistically or graphically. A number of calibration charts must be furnished, because each corn hybrid may have a slightly different calibration curve. In the case of some closely related hybrids, however, the same chart may be used for each of them.

Preparation of these charts using the Brown-Duvel moisture in percent as a maturity index has been found desirable because this basis is most familiar and is used to calculate growers' payments.

Special Refractometer

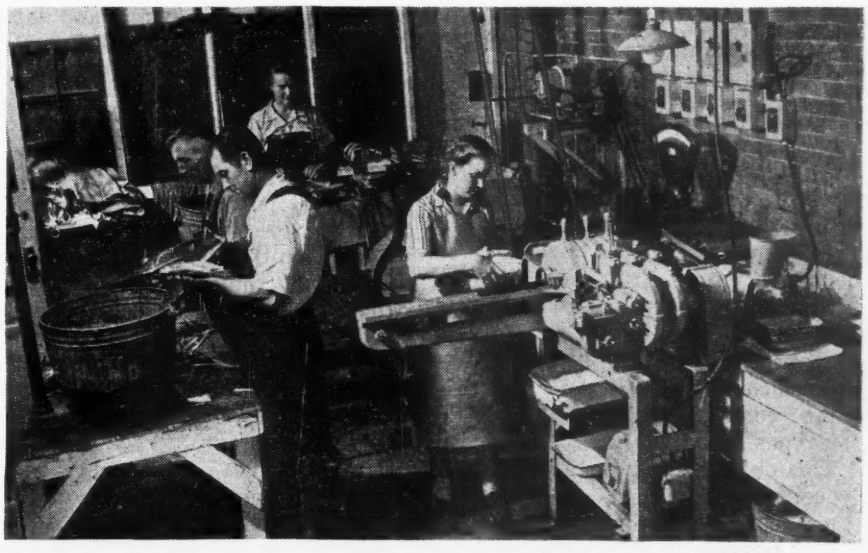
In developing this method of grading sweet corn for maturity, a number of difficulties were experienced. The greatest of these was the lack of a proper instrument. The instruments available at the time this investigation was begun were of the Abbe type with very small prisms of large range. The method requires an instrument with prisms of small range and large areas. Since the liquid sample is not transparent, the prisms must be set closely to permit sufficient light to pass through the sample. An instrument having the qualities desired for this work was designed and constructed by Gaertner Scientific Co., Chicago. This instrument is of the Abbe type with large prisms having low clearance. The pan placed beneath the prism assembly is designed to receive the overflow of the sample as well as the water used to flush the prism surfaces.

The optical system of the telescope deserves special consideration. Since the liquid from the sample is not a clear homogeneous solution, the image seen through the telescope of the refractometer is not a sharp line between the dark and the light parts of the field. Instead, there is a rather wide gradation from dark to light. In the past, some difficulty had been experienced in obtaining check readings from several operators using the same sample. The discrepancies were the result of readings being made in various parts of the dark to light range. Errors from this source usually were not great, but constant supervision was required to maintain satisfactory accuracy. In the Gaertner instrument, this effect is eliminated by dividing the light entering the telescope, placing a reversing prism in one half and subsequently recombining the fields. Two light fields are observed through the telescope, these being separated by a dark field. As the angular setting on the prism is increased, the light fields approach each other and finally become superimposed. Arbitrarily, the correct setting is taken to be that at which the dark line in the center of the field just disappears. With this arrangement, development of completely untrained personnel into precise operators with a few hours of instruction is possible.

The auxiliary equipment needed includes a small recirculating pump, a constant-temperature water bath, a thermometer, and a suitable light source. The original light source was a General Electric sodium-vapor "Lab Arc." Its low brightness made this lamp unsatisfactory for prolonged use. A more satisfactory arrangement is an inexpensive projecting-type microscope lamp of high intensity and with a colored-glass light filter such as a Corning No. 3482. The color of the filter is of little importance except for checking the zero point of the instrument with distilled water.

Significance of Measurements

Actually, the refractometric method provides an independent index of maturity which has been related to the moisture content in the calibration procedure. Our thinking is that this index is superior to that provided by the moisture con-



Pregrading laboratory for testing usable ears of raw sweet corn for maturity and moisture content is equipped with husker and cutter identical with those in production department.

tent in many ways. It does not vary as much during the course of a season as do moisture determinations. It is less affected by very wet and very dry weather conditions. A very close correlation exists between refractive index and the sugar-starch ratio. Since the sugar-starch ratio is an excellent index of maturity, this correlation is gratifying.

As previously mentioned, the curves of refractive index versus maturity vary with different varieties of corn. For a fairly large number of hybrids, however, the maturity ranges are approximately as follows: Fancy whole kernel corn will have an $n\frac{25}{D}$ of 1.367 to 1.374 and fancy cream style an $n\frac{25}{D}$ of roughly 1.385. However, these values will vary considerably with the variety of corn under test. These values are approximate, but they illustrate the ranges and variations encountered.

Original experimental data using a standard Abbe-type refractometer resulted in a correlation coefficient of 0.89 between percent moisture as determined by the Brown-Duvel method and the refractive index on 1,223 samples. The moisture could be predicted with an error of ± 1.5 percent for the individual sample. On the average, the error should be considerably less than this figure. With the present improved refractometers and sampling methods, the accuracy can be expected to be at least ± 1.0 percent moisture on individual samples. Greater accuracy than this would be offset by sampling errors.

Advantages of Method

The greatest advantage to the refractometer method is the speed with which analyses can be made. An average time of only 1½ minutes is required for one determination, compared with approximately 35 minutes for the Brown-Duvel method.

The operations in the corn-storage yard are much simplified if an accurate grade on each entering truckload is available by the time the corn is reloaded onto the wagons on which it is to be stored. This objective may be accomplished easily with the refractometric method. With proper organization, it is possible to obtain the grade on a truckload of corn within the time required to weigh the truck and to complete the receiving ticket. The load then can be dumped directly at the production line and save a reloading operation. The speed with which these determinations can be run makes possible the sampling of every load received, even during the busiest hours. Finally, the method has reduced the number of operators required in the green-corn grading operation, as well as the number of men and tractors required in the storage yard.

Although this method of testing maturity is covered by U. S. Patent No. 2,329,936, a licensing arrangement permits its use upon payment of a fixed fee per refractometer. One refractometer is sufficient for a large cannery.

MILK COSTS And Potential Cuts

Here are the highlights of a government report showing the expense of each step in supplying fluid milk to the consumer and suggesting savings to avoid a rise in price

ANY postwar slackening in the demand for dairy products will tend to focus attention on possible ways to make distribution more efficient, since it is largely in distribution that the cost to the consumer can be lowered without sacrificing product quality. The need for information on costs and marketing margins in the dairy industry thus becomes apparent. The Bureau of Agricultural Economics of the Department of Agriculture is preparing a detailed report, and a summary of the portion pertaining to fluid milk was recently published by the Bureau.

More than 50 percent of all consumer payments for milk and dairy products, in the 1935-39 period, were for fluid milk and cream, according to the summary. It is estimated that about 60 percent of the fluid milk sold in cities and villages in 1939 was delivered to homes, about 20 percent to retail stores, and 20 percent to institutions. Slicing up the consumer dollar paid for whole milk, the report found that 29 percent went for wholesaling and retailing services, 9.6 for processing, 6.1 for assembly, and 55.3 percent for farm production.

Based on an average 1939 retail price of 11.4 cents per quart for fluid milk for consumption, these percentages add up to 6.3 cents per quart paid to the farmer, and 5.1 cents as the marketing margin.

Since 1940, payment to farmers has advanced over 50 percent in many areas, and wages paid for marketing milk have increased from 50 to 100 percent, but milk prices to consumers have advanced relatively little.

It has been possible to keep these prices down, in the face of higher costs, because of reductions in services to consumers, a more stringent purchase and resale program, and other wartime efficiency measures.

Marketing Costs May Rise

But now that the war has ended, consumers may again demand former peacetime services. This demand will increase marketing costs unless offset by more efficient methods of distribution. If the wartime economies are not retained or more efficient methods adopted, the producer will have to accept lower prices for his products, labor engaged in milk processing and distribution will have to accept lower wages, prices to consumers will have to be increased or government subsidies will have to be paid.

For 32 milk distributors filing detailed accounts with the Federal Trade Commission in 1939, assembly costs made up 15.7 percent, processing 23.5, retailing and wholesaling 60.8. The breakdown according to cost items was 59.1 percent for wages and salaries, 14.5 for vehicle and property expense, 2.9 for advertising, 16.4 for other

costs and 7.1 profit. In seven cases, where the costs by items were summarized, wages and salaries made up from 49 to 64 percent of total classified expenses, supplies and purchased services ran from 9 to 29 percent, while property and vehicle expense accounted for 17 to 33 percent. Some of these differences are due to varying methods of classifying costs. In most of the studies, advertising expenses made up 2 percent of the total, and credit losses, 1 percent.

Hauling Costs

While retailing offers the major field for any cost reduction program, the opportunities for improved efficiency in the milk assembly plants and in both the country and city processing plants should not be overlooked. Two ways are suggested for reducing costs in milk assembly: (1) By reducing charges where they are out of line with the hauling services rendered. (2) By a reorganization of hauling routes, preferably under the supervision of farmers' cooperatives.

A study in New England revealed that with average daily volumes of 4,000 to 5,000 lb., the most efficient country plants would have costs of nearly 30 cents per hundredweight. With volumes of 20,000 lb., the average costs are reduced to 13 cents. Volume increase in the country plant is limited, however, by transportation costs. The volume could be so large that, in spite of low plant operational costs, transportation costs would increase to an amount exceeding the savings that are effected.

But the city plants have no such transportation limits. Average processing costs are found to vary from about 3 cents per quart for plants handling about 250 qt. daily, to about 1.5 cents for those handling 2,500 qt., and approach 1 cent for the more efficient large-scale operators. These costs probably can be reduced even further by processing in the more efficient plants and by operating these plants closer to optimum capacity.

Milk Delivery

Estimated costs of retail milk delivery in quart bottles vary greatly from market to market and between retail and wholesale forms of delivery, ranging from 2 to 6.6 cents per quart. Separate estimates of wholesale and retail delivery show clearly that the wholesale form is lower in cost. And, of course, labor costs represent the major part of the costs of delivering milk, no matter what the form. In New Jersey, for example, labor accounted for about three-fourths of the total sales and delivery costs on retail routes, and about three-fifths of the total on wholesale routes. Naturally, any program for the reduction of delivery costs must give particular attention to the effects it will have on labor costs per quart of milk. The problem is the difficult one of delivering more quarts of milk for each dollar spent for labor, as well as more quarts per hour of work.

War Measures

Various programs for reduction of milk delivery costs have been proposed and a few have been adopted as wartime measures. Most notable is the alternate-day delivery and elimination of special deliveries. This has saved from 35 to 45 percent in truck mileage, and has reduced costs, exclusive of labor, 0.3 to 0.5 cents per quart. The effect on labor costs depends largely on the method of paying the route drivers. Other proposals involve allocation of exclusive territories, abolition of home delivery in certain areas and prohibiting pint containers on home-delivery routes. Finally—and much more far reaching—is the proposal to operate milk processing and distribution as a public utility.

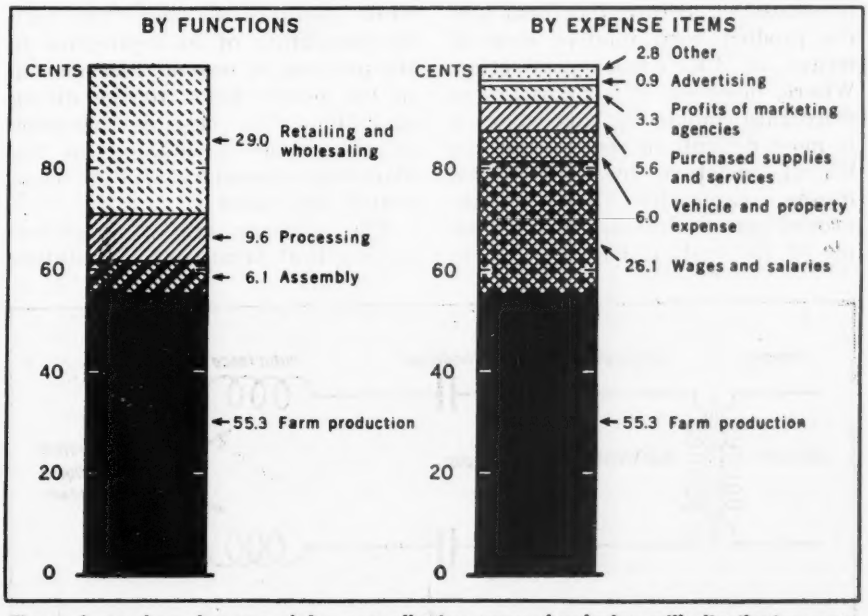
Sales through stores were on the increase between 1930 and 1941 and might be indicative of a trend in this direction. In Chicago, these sales increased from less than 25 percent in 1930 to about 50 percent of total sales in 1941. In New York the increase was from 30 to 50 percent of the total.

Five Possibilities

In general, costs in fluid milk marketing can be reduced in five ways: (1) By increasing the efficiency where duplication, unused capacity and other wastes make savings possible; (2) realizing, by a program of consolidation, the economies of scale that are so important in achieving low-cost plant operation; (3) reducing charges when they are not in line with services rendered; (4) adjusting the methods of payment of labor so that gains from increased labor efficiency will be reflected in lower marketing charges; and (5) diverting milk distribution away from high-cost methods, even though certain services may be reduced. In carrying out this last proposal, it may be desirable to pass along a part of the savings to the consumer through price differentials. Consumers accepting curtailed services would thus pay less for their milk.

Store Sales

One such diversion is illustrated by the revised buying habits in the New York market. Reduction in mechanical costs were offset by higher wages and rising distribution costs. However, before 1933 only one-third of the milk for home consumption was delivered through stores, while in 1943, store sales measured two-thirds of all such deliveries.



These charts show that one of the most effective ways of reducing milk distribution costs is through more efficient use of labor and equipment. The charts indicate where the dollar goes that the consumer pays for milk. (Data estimated for 1939 by the Bureau of Agricultural Economics.)

ELECTRONIC HEAT Inactivates Enzymes in Potatoes

Experiments indicate that it is possible to heat peeled potatoes rapidly and quite uniformly by high-frequency electrical conduction. Dielectric heating also discussed. Pertinent cost data given

By ARTHUR L. SCHADE
Overly Biochemical Research Foundation, Inc., New York, N. Y.

IN the opinion of leaders in the field of high-frequency application to the problem of dehydration, per se, economic considerations constitute the main deterrent to its general use. Technically, no grave difficulties are involved in high-frequency capacitive (dielectric) heating of foods provided: (1) The geometry of the setup is such that the material to be dried can be introduced between electrodes that are substantially equidistant at all points; (2) this produce is uniform with respect to density and moisture. A uniform product in a uniform field will heat uniformly.

From the standpoint of economics, high-frequency capacitive heating is not recommended for removal of large percentages of water. Such heating cannot compete with conventional means where it is possible to introduce heat into the product with relative ease by means of thermal conduction. Where, however, it is necessary to dehydrate completely, and where it is most difficult to remove the last bit of moisture by conventional means, capacitive heating has proved very desirable. As an example of the cost, it has been calculated that the capital investment for high-frequency capacitive equipment to vaporize 1 lb. of water per hour, with an initial temperature of 25 deg. C., is $500. This adds up to roughly $1,000,000 for new equipment to remove one ton of water per hour. Further, it has been calculated that the operating cost to remove 1 lb. of water is 2 cents, or $40 a ton. Since the latent heat of water is high, requiring for vaporization from room temperature about 1,100 B.t.u. per pound, 1 kw.-hr., or 3,450 B.t.u. will vaporize only 3 lb. of water. At a charge of 1 cent a kw.-hr., the cost of electricity alone for removal of 1 lb. of water is thus 0.3 to 0.4 cent.

Our interest in the use of high-frequency heating has not been concerned with the dehydration of white potatoes as such, but with the possibility of its application to the problem of enzyme inactivation in the potato prior to the dicing operation. The possible extension of this type of heating to the blanching procedure will be elaborated upon later.

The primary aim of high-frequency heat treatment of potatoes was to reduce enzymatic activity sufficiently to prevent costly discoloration or other undesirable changes of enzymatic origin which occur during the dicing, blanching and drying. The possible advantages of the use of high frequency over other methods of heating lay in the speed, as well as the fair uniformity, of heating throughout the mass of the potato. It was planned to heat the potatoes prior to removal of their peels or, if necessary, immediately after peeling, since it was believed that most of the enzymatic discoloration occurs between peeling and blanching.

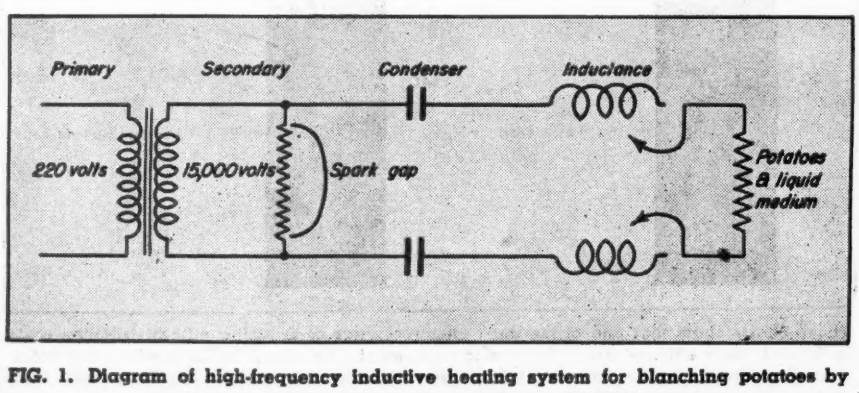


FIG. 1. Diagram of high-frequency inductive heating system for blanching potatoes by conduction. It is a 12-kw. unit operating at 250,000 cycles.

Capacitive Heating

Consideration initially was given to the feasibility of using dielectric heating for treating potatoes. In this type of heating, absorption of energy takes place in the electrostatic field between the plates of the condenser of an output circuit of a high-frequency generator.

In preliminary tests, potatoes were placed between the condenser plates of a 15-kw. high-frequency generator of 30 megacycles. Considerable sparking occurred between the plates and the potato peels, with consequent charring of the tissues. The high voltage across the condenser plates required to pass sufficient energy through the potato to produce heat at a rapid rate, in conjunction with the differential of the K values (dielectric constants) of the air and of the potato, apparently was responsible for the sparking.

After further tests relating to the conductivity of the potato and the application of capacitive heat-

*From a paper presented at Conference on Recent Technical Advances in Army Dehydrated Foods, in Chicago, Feb. 1, 1945.

ing, it was concluded that this type of high-frequency heating was not applicable to the problem at hand. The major factors which led to this conclusion were:

1. The irregular shape and volume of potatoes, which make it difficult to attain uniform distribution of current through the entire mass.
2. The nonuniformity of the conductivity of the potato, the peel in particular having a very high resistance relative to the quite conductive interior.
3. The initial costs and high maintenance expenses (replacement of tubes and so forth).
4. The estimated overall heating efficiency can be only 50 percent or less, because of the inherent losses of an ultra-high-frequency oscillator.

These considerations and others led us to direct attention to the possibilities of high-frequency conductive heating.

Conductive Heating

To heat potatoes conductively, they must be placed in an electrical circuit to permit current to flow through them. The transfer of electrons involved in this current flow is responsible for the heat generated within the potatoes.

For the experiments described below, the potatoes were placed between electrodes connected to a 12-kw., high-frequency (250,000 cycles) inductive heater whose principle of operation is diagrammed in Fig. 1. A spark-gap oscillator furnished the high-frequency current, and the condensers (capacitors) were alternately charged and discharged through the potatoes and the surrounding liquid medium.

The arrangement of the electrodes and the vessel employed to hold both the potatoes and the liquid medium is shown in Fig. 2. The temperature of the liquid medium was measured midway between the two electrodes, and meters recorded volts, amperes and watts.

Resistance of Potatoes and Medium—It was desirable to have the resistance of the potatoes and liquid medium as uniform as possible. So we determined the resistance of the potato, as shown by its several anatomical parts, before and after heating to 90-100 deg. C. Then we prepared a saline (NaCl) solution whose resistance value fell midway between that of the uncooked and cooked potato.

Cubes of freshly cut potato pith (temp. about 20 deg. C.) with a face area of 196 sq. mm. were placed between two copper electrodes. The electrodes were then

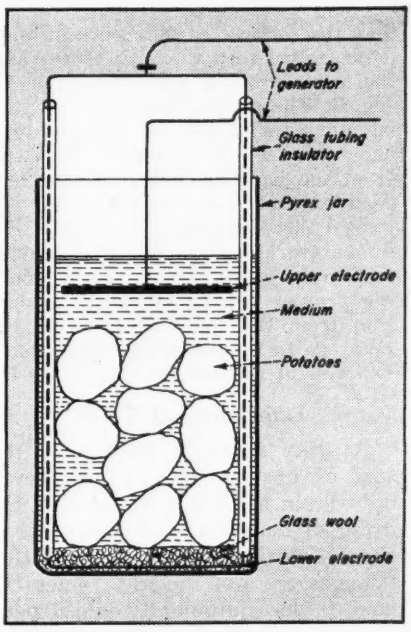


FIG. 2. Arrangement of the electrodes and vessel used to hold potatoes and the liquid medium in which they are immersed for high-frequency conductive heating.

connected to an ohmmeter and the resistance noted. When one to four cubes were added linearly and consecutively to the initial cube, the resistance increased in direct proportion to the number of cubes. (See Table I.)

From these values it can be calculated that the resistivity of a centimeter cube of the potato at 20 deg. C. was about 4,300 ohms. This value was approximately that found for several other potatoes.

During some preliminary experiments with conductive heating, we measured the resistance offered by various sections of the potato. Two methods were used:

1. To determine the resistance of the peel as against that of the tissue beneath the peel, we applied the blunt ends (about 3.2 sq. mm.) of electrodes to the peel at opposite ends of a washed potato at 20 deg. C., the electrodes being 3 in. apart. After this resistance was measured with a conductivity bridge, the peel immediately beneath the electrodes was removed and the resistance again determined. The values obtained were:

Potato with peel....1,000,000 ohms
Potato without peel. 10,000 ohms

2. We also determined the differences in the resistance of the cortex and the pith, and of the cooked and uncooked pith. Two electrode holders were sealed in a wood block and the fixed electrodes inserted into potato sections, resistance being determined with a conductivity bridge. The electrodes were ⅜ in. long, tapered to a point from a base of 2 mm. in diameter, and were about 1½ in. apart. The potatoes tested were halved and the electrodes inserted their full ⅜-in. length into the various exposed sections. The measured resistance values are given in Table II.

Of particular interest is the great drop in the resistance of the potato when cooked. When a juice was prepared from uncooked potatoes, its specific resistance at 18 deg. C. was 118 ohms. It may thus be concluded that the relatively high resistance of the raw, intact potato is a function of the living potato tissue. When the viable cellular structure is destroyed, either by heat or by mechanical means, the observed measured resistance is a function merely of the electrolyte concentration.

It obviously is impossible to prepare a liquid medium (for immersion of the potatoes) which would have the same resistance as the potato throughout the heating process. Yet, it was found that a saline solution with a resistance of 500 to 600 ohms at 25 deg. C. is quite satisfactory, provided that the potatoes were peeled before being subjected to high-frequency conductive heating. A 0.1 percent sodium chloride solution was used.

Experimental

Of the experiments run to determine the conditions necessary for the establishment of a process of conductive heating which might hold promise for large-scale utilization, we choose the following for detailed exposition.

1. Six medium to large potatoes of the Long Island Green Mountain variety (weight, about 2½ lb.) were washed and peeled by scraping with a steel knife. Three liters of a 0.1 percent salt solution, whose measured resistance at 22.5 deg. C. was 585 ohms, was put into a large glass cylinder (Fig. 2). The lower electrode was next put into the cylinder and covered on its upper side with a layer of glass wool upon which were placed the six potatoes. The upper electrode was then set in place 1 in. above the potatoes, but 1½ in. below the surface of the saline solution. The temperature of the saline solution and potatoes was 23 deg. C.

The high-frequency generator operated on 240 volts; the power output was 11 kw. After 3 minutes and 5 seconds, the temperature of the liquid medium was 80 deg. and that of the potatoes (at the center) was 95 deg. C. The potatoes were quite evenly cooked throughout, although the greatest heating had occurred in the

center of the pith and the least in the cortex. The difference in temperatures, not more than 10 deg. C., was primarily due to the relatively cold suspending medium to which the potato lost heat by conduction.

Qualitative enzymatic tests for tyrosinase and peroxidase indicated complete loss of tyrosinase activity and partial loss of peroxidase activity by the cooked potato.

2. Conditions as described in experiment (1) were duplicated for the next experiment, except that six washed *unpeeled* potatoes were used. When the temperature of the saline solution reached 80 deg. C., the current was shut off. In this instance, the time of heating with the 11 kw. was 2 minutes and 50 seconds. The temperature at the center of the potatoes was 58 deg. C. and both the pith and the cortex were uncooked. The outer portion of the cortex showed slight cooking by thermal conduction from the heated saline solution. When the results of this experiment are compared to those obtained in experiment (1) the importance of the very high resistance of the peel becomes evident.

Results obtained in experiments (1) and (2) are summarized in Table III.

3. To get an indication of the cost of heating by the high-frequency conductive process, we put 4 lb. of washed, peeled potatoes into 3 liters of 0.1 percent saline solution. The initial temperature of the potatoes and solution was 23 deg. C. Ten kilowatts was used or heating over a period of 2 minutes and 58 seconds. At the end of this time, the saline solution temperature was 65 deg. C. while the potato centers registered 92.5 deg. C. Although the potatoes were quite uniformly heated throughout, the pith again was cooked more than the cortex, the difference in temperature between the pith center and the cortex being approximately 10 deg. C. The potato, however, was satisfactory for dicing. If the potatoes had not been immediately removed from the bath after the current had been turned off, but had been left for two to three minutes in the bath, the temperature would have been equalized to the overall benefit of the cooking process through thermal conduction from the inner portions of the potatoes to their outsides. Results of experiment (3) are given in Table IV.

Table I—Resistance of Potato Cubes

No. of cubes*	Resistance (ohms)
1	3,000
2	5,750
3	9,000
4	11,000
5	14,500

*Area of face of each cube = 196 sq. mm.

Estimation of Costs

At this stage of the work, the cost of heating can be considered only from the point of view of the order of magnitude of such cost. In these considerations, depreciation charges are not included, since the cost of the equipment would depend so greatly upon many unknown factors. It is possible, however, to make some calculations relative to power costs.

In experiment (3), 126,000 gram-calories was required to raise the temperature of 3,000 g. of saline solution from 23 to 65 deg. C., and the same number gram-calories was used to heat the 1,816 g. of potatoes from 23 to 92.5 deg. C. (assuming that potatoes have a specific heat of 1). Ten kilowatts was used for approximately three minutes. Thus, 0.5 kw.-hr. was required to effect the temperature rises noted. For purposes of calculation, it was estimated that 1 kw.-hr. costs 1 cent. Table V summarizes the essential data and final calculations.

Since the high-frequency apparatus used in these experiments was chosen from those available at the Ecco Laboratory* and has really been designed for quite different applications, it is the belief of the manufacturer that a generator with an output efficiency of 80 to 85 percent, rather than the observed 58 percent, readily could be built. So far as heating the potatoes is concerned, the cost of the energy required to raise the temperature of the saline solution from 23 to 65 deg. C. represents a loss. In this particular experiment, the cost of heating the suspending medium was equal to that of heating the potatoes themselves. By reducing the weight of saline solution relatively to the weight of potatoes, a decrease in energy loss and cost could be effected. Further, it appears likely that means could readily be devised to make use of this heated saline medium to preheat the potatoes subsequent to the washing process and prior to peeling.

*We very gratefully acknowledge the invaluable assistance given and interest shown by Emil Capita of the Ecco High Frequency Corp. Mr. Capita generously made available to us the facilities of his laboratory for this work.

Conclusions

The results of our experiments indicate that it is possible to heat peeled potatoes rapidly and quite uniformly through the use of high-frequency electrical conduction. The degree of uniformity probably could be increased if steam-peeled potatoes were available for testing purposes, since this method of peeling would tend to lower the resistance of the cortex of the potato to the value found for the pith, or below. Even without steam peeling, the potato can be cooked satisfactorily by conductive heating through regulation of the time interval between the shut-off of current flow and the removal of the potatoes from the saline medium, or through regulation of the rate of current flow.

It would be very desirable to extend the present findings to pilot-plant tests, with high-frequency ap-

(*Turn to page* 190)

TABLE II—Measured Resistance Values of Potatoes

Uncooked potatoes:
- Both electrodes in the pith: 2,900 to 3,000 ohms at 20 deg. C.
- One electrode in the pith; other in cortex: 3,000 ohms at 20 deg. C.
- Both electrodes in the cortex: 3,900 to 4,000 ohms at 20 deg. C.

Cooked potatoes:
- Both electrodes in the pith: 165 ohms at about 30 deg. C.
- Both electrodes in the pith: 82 ohms at about 90 deg. C.

TABLE III—Results of Experiments (1) and (2) with Conductive Heating

Volume of medium (a) (0.1% saline)	Potatoes (scraped)	Power (kw.)	Time	Temp. Medium	Temp. Potatoes
3 liters	6 (2.5 lb.)	11	3 min. 5 sec.	80°C.	95°C.
(Resistance at 23°C.) = 585 ohms	(23°C.)				
(b) As above	As above (but unpeeled)	11	2 min. 50 sec.	80°C.	58°C.

TABLE IV—Results of Experiment (3) with Conductive Heating

Volume of medium (0.1% saline)	Potatoes (scraped)	Power (kw.)	Time	Temp. Medium	Temp. Potatoes
3 liters	4 lb.	10	2 min. 58 sec.	65°C.	92.5°C.
(Resistance at 23°C.) = 585 ohms	(23°C.)				

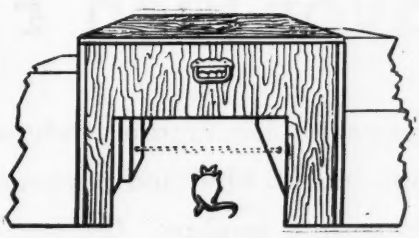
TABLE V—Estimation of Costs

Vol. of medium	Weight of potatoes	Temp. rise	Gram-calories	Calc. total energy in kw. hr.	Observed total energy in kw. hr.
3 liters	.....	42°C.	126,000	0.29	0.5
.....	1,816 g.	69.5°C.	126,000	....	....

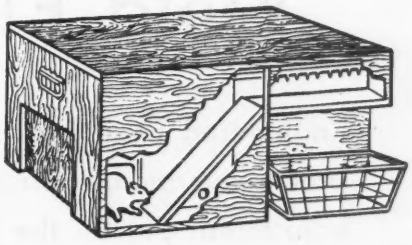
Calc. output efficiency, 58%. Calc. cost per lb. of potatoes, 0.0625 cent.

ELECTRONIC RAT TRAP

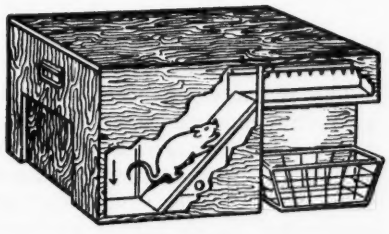
It is not, as it may seem at first thought, a Rube Goldberg contraption. It works, and effectively. Food processors using it have given it their approval



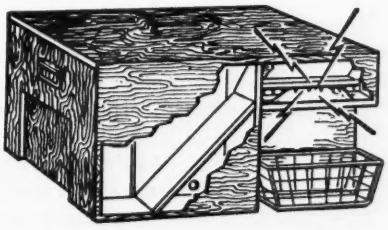
1. Rat starts through tunnel formed by trap. When he breaks the electric-eye beam, the doors drop at both ends of the trap.



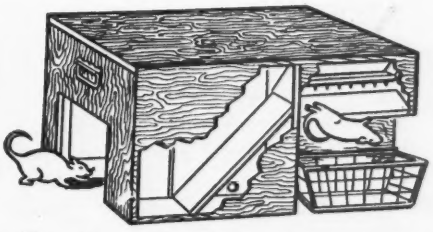
2. As the tunnel doors drop, the small door at the side of tunnel opens. Seeking an escape, the rat rushes into side compartment.



3. Still looking for a way out, the rat moves up ramp to the execution chamber. His weight on the ramp drops the small compartment door.



4. Rat races into the electrocution chamber where he is gripped firmly by electrodes that pass the lethal current through his body.



5. After the rat is killed, floor of death chamber drops to deposit body in basket. Trap automatically resets itself for next victim.

THE Pied Piper of Hamelin tried to do away with rats by means of hypnotism with music. Through the years, poisoned bait, mechanical traps and the proverbial "mouser" have all played a part in the fight to exterminate the rat population. Now comes a 20th century method —the electronic trap, developed by Electronic Traps, Inc., Rochester, N. Y.

At first glance, this automatic trap looks like a Rube Goldberg contraption. But it isn't. It works, as food processors using it will tell you.

In a study of rats, the inventors found that the rodents don't like dead-end streets, are very reluctant to trod on an unfamiliar surface, and invariably take the same route from their hideout to the place where they seek food and water. Taking advantage of these observations, a trap was built which has no floor and which is open at both ends like a tunnel. The trap is placed over rat-runs, these being indicated by tracks and droppings. It can be plugged into any convenient electrical outlet.

The unsuspecting rat starts through the tunnel of the trap. Midway, he breaks an electric-eye beam, causing the doors at either end of the tunnel to drop quickly. In the same action that closes these doors, a small door at the side of the trap is opened. The rat sees this possibility of escape and rushes through this door into a small compartment with a ramp leading upward to an electrocution chamber. As the rat climbs this ramp, his weight drops behind him the small door through which he entered the small compartment. At the same time, his feet are tickled by a slight electric shock, and he bolts into the electrocution chamber at the top of the ramp. There, an electric contact clamps him tightly in the vise of electrodes which pass electric current through his body. The shock from the building's regular 110-volt current kills the rat quickly. Thereupon the death chamber floor is dropped by electric control, depositing the dead rat's body in a basket outside the trap. As soon as this cycle is completed, the trap is automatically reset for the next victim.

The entire procedure from the time the rat cuts the electric-eye beam to his death and the resetting of the trap averages about three minutes. The trap takes care of itself automatically.

The manufacturers state that their engineers have arrived at the unquestioned conclusion that the death of one rat in the trap has no bearing on others entering the trap. This is because the electrocution of the rat takes place in a separate chamber from that in which the rat is caught.

Users state that catches of two dozen rats per night are not uncommon. Some exceptional experiences indicate that as many as 80 rats have been caught in one night where the degree of infestation was great.

Rats breed 9 to 12 times a year, with litters ranging from 6 to 22. The young mature in three months, so that control of rat population is a continuous job.

Rats infested with fleas transmit to humans such diseases as bubonic plague, rat-bite fever, a form of typhus, malaria, and so on. In food plants, however, the greatest danger from rats lies in the fact that they run over food and food receptacles, depositing germs and filth carried on their bodies from sewers and the like. And often they choose food and food packages to urinate upon, which may spread yellow jaundice.

The manufacturer expects to get into unrestricted production very soon. The trap, however, is rented from the maker instead of being purchased.

New Technics by Borden Yield Flavor-Rich Fruit Puree

Engineered fresh fruit flavors for ice cream produced by special quality control, processing and blending operations. Modified pureeing machines adapted to close adjustment put all the flavor into product. Control extends from tree to freezer

By ROBERT A. LATIMER, Fresno, Calif.

NEW technics born of research are paying off in quality at the fresh-fruit puree plant of Borden Dairy Delivery Co., Fresno, Calif. Three novel machines, designed and built in the plant, are the backbone of the process.

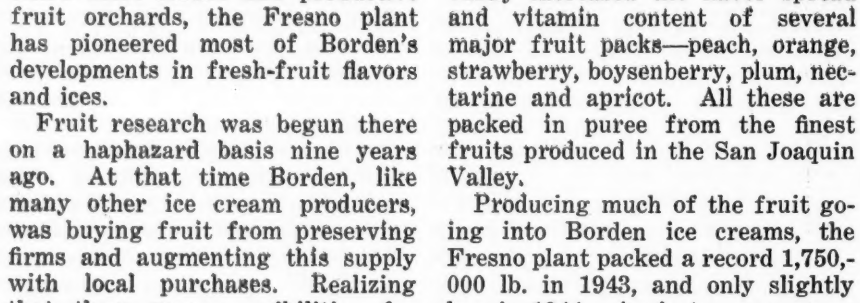
Located close to some of the nation's most fertile and productive fruit orchards, the Fresno plant has pioneered most of Borden's developments in fresh-fruit flavors and ices.

Fruit research was begun there on a haphazard basis nine years ago. At that time Borden, like many other ice cream producers, was buying fruit from preserving firms and augmenting this supply with local purchases. Realizing that there were possibilities for "engineered" fruit flavors in the San Joaquin Valley around Fresno, the management arranged a long-range program of experimentation and testing that has made the Fresno unit a research laboratory for the entire Borden organization.

After many mistakes and many successes, this plant has brought to near perfection the processing of fruit for use in ice cream, ices and sherbets. While developing methods of preventing spoilage and the resultant loss in product, it has vastly increased the flavor spread and vitamin content of several major fruit packs—peach, orange, strawberry, boysenberry, plum, nectarine and apricot. All these are packed in puree from the finest fruits produced in the San Joaquin Valley.

Producing much of the fruit going into Borden ice creams, the Fresno plant packed a record 1,750,000 lb. in 1943, and only slightly less in 1944. Apricots, a new venture last year, skyrocketed up to 19,000 lb., and nectarines, introduced as a new flavor in 1943, became quickly the most popular fruit flavor in the central California market, showing clearly how significantly the results of research can influence the market.

The management feels that the ice cream manufacturer should devote a lot of thought to fresh fruit flavors now that the postwar period is at hand. There is every indication that these flavors are going to mean even more in package and bulk sales after victory. Experience now, with 40 percent of the civilian sales in sherbets and ices, demonstrates clearly that quality in these two fields must be upped and kept that way. For maximum success, there should be a minimum of 33 percent or better of fresh fruits in sherbets and ices, and 25 percent or more in ice cream, rather than the 10 to 15 percent currently utilized. Therefore, any effort which could be spared from wartime production of ice cream has been directed toward improving the fruit-packing program.

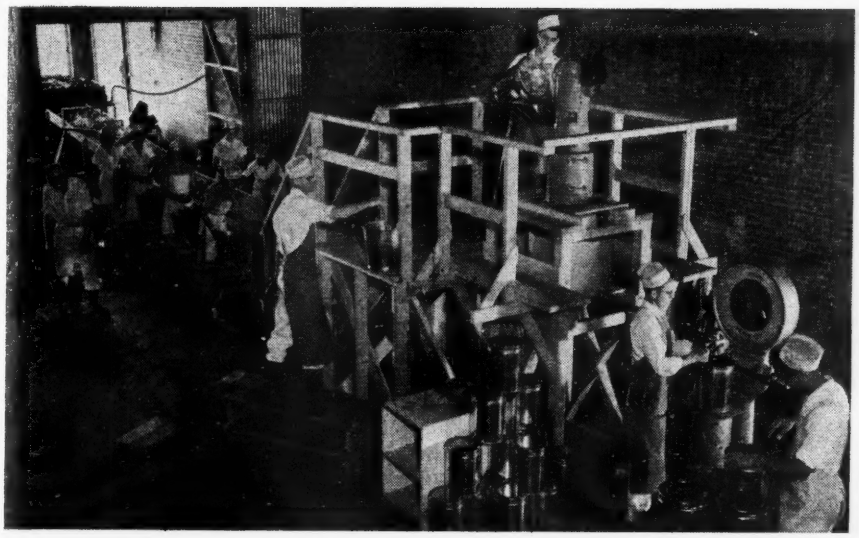


Chilled peaches are given a final inspection before they enter the disintegrator.

How to Get Good Fruit

To obtain the best fruit, Borden's buyer regularly visits potential fruit sources, checking all growing methods, spraying, pruning, irrigation, and so on. The company now gets excellent cooperation from growers by flatly guaranteeing to pay more for tree-ripened, properly grown fruit. This is essential, because tree-ripened fruit gives from two to three times more flavor per pound and four to five times more vitamins. Consequently, all fruits are packed on a hurry-up basis when each is properly ripened.

Buying experience has brought about many changes. For one thing, close supervision over the actual growing of a crop has shown that particular orchards or specific spots in the area consistently produce the finest crop. Therefore, the entire Fresno district has been



The fruit-handling lines can be set up according to the requirements of the fruit being handled. Here chilled fruit is washed with sprays, inspected and passed immediately to the modified disintegrator.

mapped, and all fruits are carefully chosen against this map.

Another discovery was that the baskets previously used to pick various types of fruit were resulting in shrinkage and bruising. Borden promptly came up with the answer in a picking box of a flat type, 3 in. high by 2 ft. long and 16 in. wide. The plant provides these for growers, and it is stipulated that they be used in picking all fruits.

As soon as the fruit is picked, it is chilled to protect the quality. Working with the fruit cold at all times eliminates bruising and dark areas. This is important, inasmuch as one bad peach, for example, can ruin many gallons of ice cream. Therefore, all fruit goes direct to an ice plant for chilling to 40 or 50 deg., and is kept cold until it goes to the pureeing machines.

Growers cooperate in this gladly. Last year, when peaches were selling for $20 a ton, the company paid $100 a ton for prize crops. This can be done because a ton of fruit produces a ton of puree of a quality which is felt to be unbeatable.

Cold fruit is delivered to the plant via refrigerated truck and processed immediately. It is washed, given two final inspections, and fed by conveyor belt to either auger or disintegrator type machines. The crew on the processing lines ranges in number from 15 to 40, depending on the volume.

Redesigned Machines

All the fruit operations revolve around three pureeing machines—special equipment which effectively moves nonusable elements of the fruits, while at the same time making the most of inner-skin pulp, kernel or pips. Two of the machines have a cone-shaped auger operating inside a similarly shaped screen. The auger forces fruit along the screen inner surface, extracting meats and desirable parts and ejecting the useless materials at the small open end. The other machine is a remodeled vegetable disintegrator of the type used by soup and puree manufacturers. It is changed over to utilize two rotating screens, one within the other, for handling fruits that require particularly "microscopic" treatment.

These machines are stainless steel throughout. They are modified for delicate pressure adjustments which permit the rotating screens to extract maximum amounts of pulp. From Santa Rosa plums, for example, it is best to extract the pulp, get the juicy innerskin, break the pip and utilize the kernel—all adding to maximum flavor per ounce. The same is true with oranges. The machines here take the oil from the peel, and all flesh from the kernel, while discarding the white pulp and seeds. When packing strawberry puree, the machines take only the soft red pulp, eliminating stem, white pulp and such. Actually, Borden has found that the close adjustment of the pureeing machine has made it possible to produce a strawberry ice cream which it can state definitely is made only with the red pulp of the berry.

All of these units are portable, capable of being set up wherever there is room. By means of light wooden scaffolds and platforms, they can be made part of a flexible production line altered from season to season.

After pureeing, the fruit is packed in 30-lb. paper cartons lined with glassine—another innovation, stemming from much experimenting with packages. Wooden kegs were tested, and were found to extract much of the fruit flavor or to give strawberries and other fruits, strangely enough, a metallic taste. Only specially treated and lined tin containers or paper will be used in the future. At the start, Borden tried everything in containers, and unhappy results brought about the above.

After its final inspection the puree is sealed and rushed immediately to the ice company for sharp freezing at temperatures down to 0 deg. F. It is always shipped at less than 10 deg., this temperature being maintained when the fruit goes east by stacking cartons only four high and shipping 40,000 lb. in a 60,000-lb. car, with extra icing and salt.

In every case, development has proved that Borden can get a full ton of puree from every ton of raw fruit—simply adding sugar and omitting preservatives or fillers. Tracking down the better sources of fruit and paying for top quality results in flavor-laden puree which needs no chemical assistance.

Blended Flavors

Scores of ideas have been tested and discarded in building up this current fruit-puree production system. One of the most remarkable has been the discovery that it is possible to combine fresh fruits to produce other flavors—for example a combination of nectarines and plums has produced a perfect strawberry ice cream which fools experts, according to Dudley Carlson, divisional manager. "We've learned that basic fruit flavors can be compared with the color spectrum," he said. "By blending various fruit flavors we can almost reasonably duplicate any other, and more important, we've found that the addition of a touch of one flavor can vastly improve that of another fruit—something like the catalyst in releasing more taste."

So successful has steady research been that Borden's many plants now look to the Fresno unit as the source of new flavors and postwar elaboration of the flavor line.

Acknowledgment — The author wishes to thank Dudley Carlson, who supplied the information upon which this article is based.

Swiss Cheese At Home

Cheese making has been the sole industry of the little town of Gruyere, since before the Crusades. Here's how it's done

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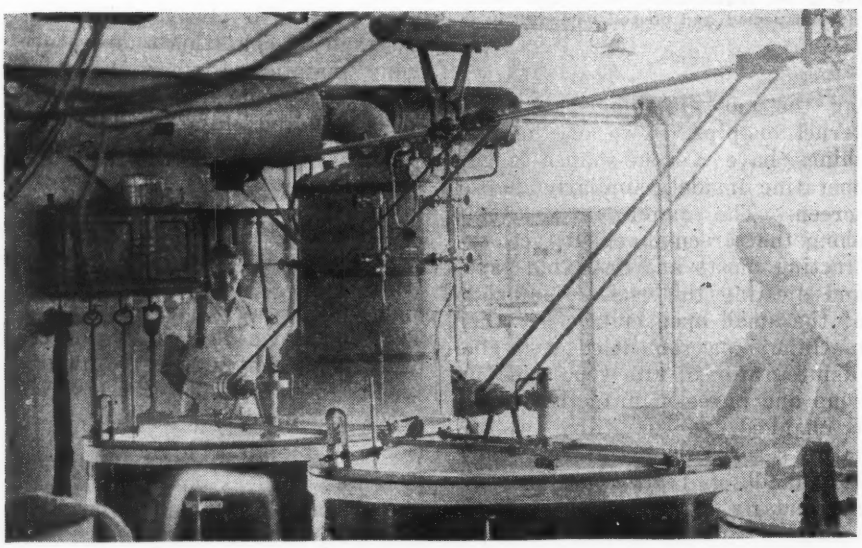
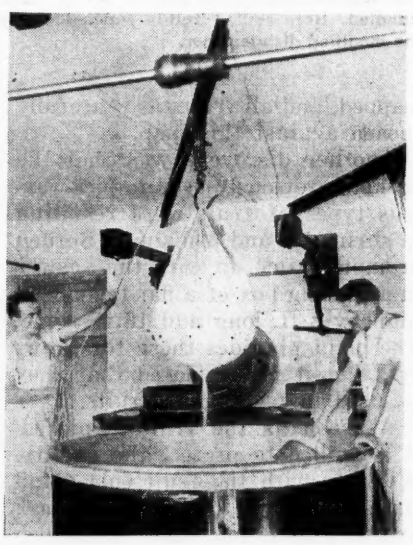
Authenticated News Photos

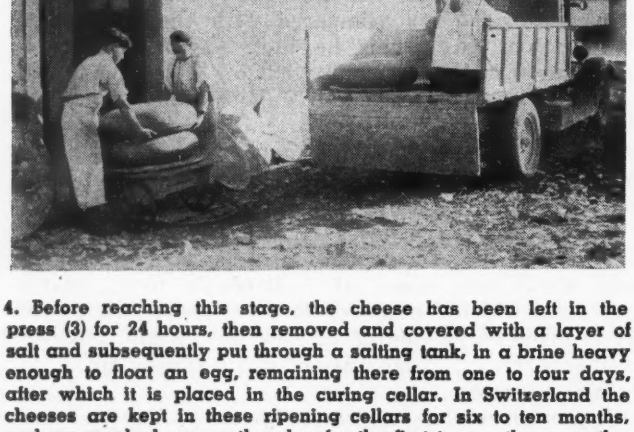
1. Farmers milk the cows in a chalet, such as this, and deliver the milk to a cooperative plant. Fine herds give milk with a very high cream content.



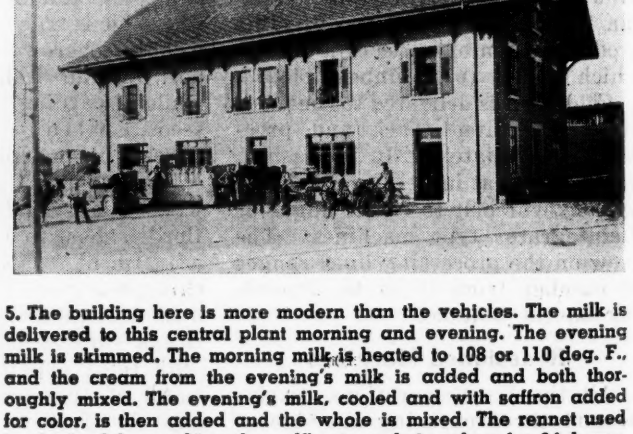
2. The processing is done in big copper kettles, where the milk is heated to 90 or 95 deg. and rennet added. The resulting curd is drawn to one side of the kettle and stirred with a "harp" to cut it very fine. Heat is then applied, ranging from 126 to 140 deg. F., and the stirring continues until the curd is properly firmed.



3. After cooking, the curd is lifted by a heavy linen cloth and pulley and lowered into the forming hoop on the draining table at the rear.



4. Before reaching this stage, the cheese has been left in the press (3) for 24 hours, then removed and covered with a layer of salt and subsequently put through a salting tank, in a brine heavy enough to float an egg, remaining there from one to four days, after which it is placed in the curing cellar. In Switzerland the cheeses are kept in these ripening cellars for six to ten months, and are washed every other day for the first two or three months. There are two types of Gruyere cheese manufactured in this valley, Swiss and Emmenthaler, rich creamy cheese with no holes.



5. The building here is more modern than the vehicles. The milk is delivered to this central plant morning and evening. The evening milk is skimmed. The morning milk is heated to 108 or 110 deg. F., and the cream from the evening's milk is added and both thoroughly mixed. The evening's milk, cooled and with saffron added for color, is then added and the whole is mixed. The rennet used is obtained by soaking the calf's stomach in whey for 24 hours. Fine quality Gruyere of either of the two varieties should have a very heavy cream content to achieve full flavor and texture.

Freezing Cooked Foods

A wide variety of cooked fruits, vegetables, meats and combination dishes can be frozen satisfactorily. The authors have determined what items are best suited to this method and how they should be prepared and packaged

By J. G. WOODROOF and IDA S. ATKINSON,*
Georgia Agricultural Experiment Staton, Experiment, Ga.

FROZEN COOKED foods are becoming increasingly popular because there is a growing demand for ready-to-serve dishes. Already there are a number of excellent cooked foods in freezer locker plants and on the market. And there are some that are very poor. It was the purpose of this study to determine the suitability for freezing of cooked fruits, vegetables, meats and combination dishes. Methods of preparation, types of containers and methods of serving also were investigated.

Individual items of unseasoned foods seldom are cooked and frozen. Rather they are seasoned and combined to produce a desirable appearance, consistency, texture, flavor, aroma and color. The suitability of a product or dish for cooking and freezing depends on the combined behavior of the representative items which go into it.

All of the factors which go to make a good frozen raw product—proper selection, grading, preparation, packaging and freezing—are essential for a good frozen cooked product. To these must be added correct cooking time and temperature and rapid cooling. Of importance is the selection of the proper liquid or medium with which to cover the products that require it.

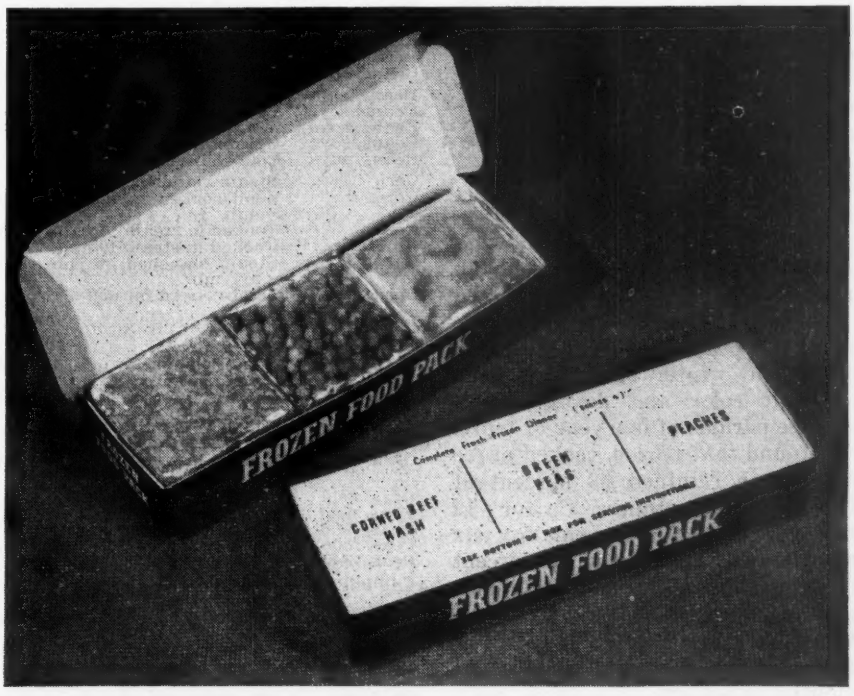
Certain advantages of cooking foods before freezing are: It may mean a saving in time and labor on the part of the housewife or the one who prepares short orders. Brunswick stew, chicken a la king and shrimp creole are examples. It would provide many dishes that can neither be kept fresh nor canned—such as pie mixes and sauces. Lastly, it would provide properly cooked foods which are now available as canned products, but which are overcooked.

The experiments reported herein show that it is more difficult to prepare cooked foods than it is raw foods for freezing. But the possibilities are as great for freezing cooked foods as for freezing raw foods. As know-how is acquired, the canning industry may be considerably affected.

Freezing Preheated Fruits

Since many fruits are consumed raw, there is less demand for frozen cooked fruits than for frozen cooked vegetables or meat. In the past several years, the blanching of apples, apricots and firm-flesh peaches prior to freezing has become increasingly common. The purpose is to prevent browning and improve flavor. Miss Hohl[2] found that puree for baby foods from cooked peaches, apricots and pears maintained excellent color and flavor for one year. The authors[5] found that blueberries that were lightly cooked before freezing had superior texture, flavors and aroma after a year in storage, as compared to those which were frozen unblanched. Cox[1] described a frozen prepared stock for fruit jelly and jam—consisting of fruit puree, sugar, citric acid and pectin—which would keep frozen for several years and could be used to make fresh jelly or jam upon being boiled.

Information in Table I shows the desirability of eight fruits that were cooked in one of three ways and held in freezing storage for a year. Apples, blueberries, blackberries, cherries and raspberries were excellent when cooked by immersing in boiling 50 percent sirup for 15 seconds. And apples also were excellent when steamed in a closed container for 90 seconds. The same products steamed in an open vessel lost considerable flavor and were



Frozen dinner package, a meal for four. Developed by Sylvania Industrial Corp. (patent pending), it contains corned beef hash, peas and peaches.

*This project was sponsored jointly with the Tennessee Valley Authority and is published as Paper No. 41, Journal Series, with approval of the Director of the Georgia Agricultural Experiment Station.

TABLE I—The Desirability of 25 Frozen Fruit Products After One Year in Storage at 0 Deg. F.

Fruit	Treatment	Form packed*	Desirability
Apple	Cooked	Butter, solid pack	Excellent
Apple	Cooked	Sauce, solid pack	Excellent
Apple	Steamed	Stew, semisolid pack	Good
Apple	Steamed	Slices, loose pack	Fair
Apple	Boiling sirup	Slices, solid pack	Excellent
Apple	None	Slices	Poor, discolored
Apricot	Steamed	Halves, semisolid pack	Good
Blackberry	Steamed	Whole, semisolid pack	Good, color loss
Blackberry	Boiling sirup	Whole, solid pack	Excellent
Blackberry	None	Whole	Fair, bitter
Blueberry	Steamed	Whole, semisolid pack	Good
Blueberry	Boiling sirup	Whole, solid pack	Excellent
Blueberry	None	Whole, loose pack	Poor, flavorless
Cherry	Steamed	Seeded, loose pack	Fair, color loss
Cherry	Boiling sirup	Seeded, semisolid pack	Excellent
Peach:			
Firm-flesh	Steamed	Slices, solid pack	Good
Firm-flesh	Boiling sirup	Slices, solid pack	Very good
Soft-flesh	Steamed	Slices, solid pack	Poor, flavorless
Soft-flesh	Boiling sirup	Slices, solid pack	Fair, flavorless
Plum	Steamed	Seeded, semisolid pack	Fair, flavor loss
Plum	Boiling sirup	Seeded, semisolid pack	Good
Plum	Steamed	Seeded, solid pack	Excellent
Raspberry	Steamed	Whole, semisolid pack	Fair, color loss
Raspberry	Boiling sirup	Whole, solid pack	Excellent
Raspberry	None	Whole, loose pack	Fair, bitter

*The amount of sugar added to the various fruits varied, but all lots of the same fruit received the same amount.

more watery. The loss in flavor by steaming in an open vessel apparently was due to leaching as well as distilling off of the flavors.

Plums, pears and melting-flesh (Elberta type) freestone peaches were less desirable as preheated products, except when prepared as a puree or solid pack. Unpeeled plums were delicious when seeded and heated enough to produce sufficient juice to cover the halves.

Our studies show that not only certain fruits may be preheated before freezing, but that apples, blueberries, raspberries, blackberries and plums are superior in flavor when so treated. However, this is true only when proper methods of heating and suitable packages are used.

Preheated fruits should be solid-packed, without bubbles or air spaces, in rigid, leakproof, moistureproof containers.

Freezing Cooked Vegetables

Reports on frozen, cooked vegetables have been both favorable and unfavorable. Miss Hohl[2] reported that cooked puree of carrots, beets, spinach, peas, asparagus, green beans and winter squash retained excellent color and flavor during storage periods of one year or more. She found that frozen, cooked puree of spinach retained 63 percent of the original vitamin C for 12 months; peas, 76 percent for six months; and asparagus, 92 percent for six months. Purees of spinach, peas, asparagus and carrots retained 53, 77, 81 and 83 percent, respectively, of vitamin B_1 for 12 months or longer.

Woodroof[6] reported that frozen cooked sweet potato puree, pie stock or pies remained in excellent condition for several months, provided they were protected against drying out. Miss Masterman[3] found that frozen cooked beets, beet greens and asparagus proved unsatisfactory, while corn was satisfactory. Other cooked vegetables that have been frozen and marketed, as individual items, with more or less success are baked beans, candied sweet potatoes, kidney beans, lima beans, squash puree, sweet potato puree and soups, the latter including asparagus, celery, green pea, lima bean, navy bean, onion and tomato soups.

Unlike fruits, blanching vegetables for two or three minutes, to inactivate enzymes and fix the colors, does not constitute precooking, as about ten times this amount of heating is required to tenderize and develop the desired flavors in most vegetables.

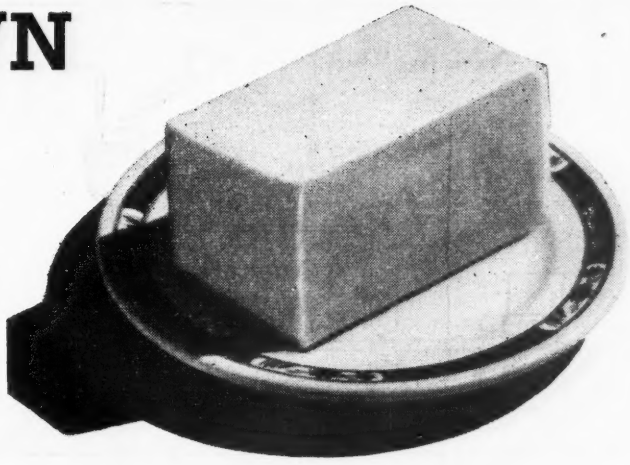
Information in Table II shows that lima beans, snap beans, soybeans, okra, field peas and cream-style corn kept in excellent condition when properly blanched and stored as a loose-pack for one year at 0 deg. F. However, when identical lots of these products were precooked (either with steam or by boiling), packaged the same way and stored for one year, they were fair to poor in quality. None of these lots was covered with a solu-

(*Turn to page* 192)

TABLE II—The Desirability of Nine Frozen Vegetables, Cooked and Uncooked, After One Year in Storage at 0 Deg. F.

Vegetable	Treatment Before Freezing	Form packed	Desirability: Before freezing	Desirability: When prepared for serving after freezing storage
Beans, lima	Steam blanched 3 min.	Loose pack	.....	Very good
Beans, lima	Cooked in steam 15 min.	Loose pack	Very good	Fair
Beans, lima	Water blanched 3 min.	Loose pack	.....	Excellent
Beans, lima	Cooked in water 15 min.	Loose pack	Excellent	Poor
Beans, lima	Cooked in water 15 min.	Solid pack	Excellent	Very good
Beans, snap	Steam blanched 2½ min.	Loose pack	.....	Excellent
Beans, snap	Cooked in steam 12 min.	Loose pack	Very good	Fair
Beans, snap	Cooked in water 12 min.	Solid pack	Excellent	Very good
Beans, soya	Steam blanched 4 min.	Loose pack	.....	Excellent
Beans, soya	Cooked in steam 20 min.	Loose pack	Very good	Fair
Beans, soya	Water blanched 4 min.	Loose pack	.....	Excellent
Beans, soya	Cooked in water 20 min.	Loose pack	Excellent	Good
Beans, soya	Cooked in water 20 min.	Solid pack	Excellent	Very good
Corn	Steam blanched 3½ min.	On cob, loose pack	.....	Poor
Corn	Semi-cooked in steam 5 min.	On cob, loose pack	.....	Fair
Corn	Cooked in steam 10 min.	On cob, loose pack	Excellent	Excellent
Corn	Cooked in steam 10 min.	On cob, loose pack	Very good	Very good
Corn	Steam blanched on cob 3½ min.	Cut corn, cream style	.....	Excellent
Corn	Semi-cooked on cob 5 min.	Cut corn, cream style	.....	Fair
Corn	Cooked in steam on cob 10 min.	Cut corn, cream style	Excellent	Poor
Okra	Steam blanched 3 min.	Whole pod, loose pack	.....	Excellent
Okra	Cooked in steam 12 min.	Whole pod, loose pack	Very good	Fair
Okra	Cooked steam	Whole pod, loose pack	Very good	Fair
Okra	Cooked in water 12 min.	Whole pod, solid pack	Excellent	Very good
Peas, field	Blanched in steam 1 min.	Loose pack	.....	Excellent
Peas, field	Cooked in steam 15 min.	Loose pack	Excellent	Good
Peas, field	Blanched in water 1 min.	Loose pack	Excellent	Excellent
Peas, field	Cooked in water 15 min.	Loose pack	Excellent	Good
Peas, field	Cooked in water 15 min.	Solid pack	Excellent	Very good
Pumpkin	Cooked in steam pressure 10 lb. 10 min.	Puree	Excellent	Excellent
Rhubarb	None	Sugar added 4:1, solid pack	.....	Excellent
Rhubarb	None	Sliced, loose pack	.....	Very good
Rhubarb	Steam blanched 3 min.	Sugar added 4:1, solid pack	.....	Good
Rhubarb	Steam blanched 3 min.	Sliced, loose pack	.....	Fair
Rhubarb	Cooked in steam	Solid pack	Excellent	Excellent
Sweet potato	Cooked in steam pressure 10 lb. 10 min.	Puree, solid pack	Excellent	Excellent

THE LOW-DOWN ON BUTTER



Yes, the butter situation is chaotic. What would you expect with production declining, government purchases increasing, a bad point system, inequitable freight rates and too low a ceiling? Here is why butter is "thin"

By H. A. RUEHE, Executive Secretary, American Butter Institute, Chicago*

PERTINENT questions concerning the present chaotic butter situation were raised in a Letter to the Editor in the June issue of FOOD INDUSTRIES (page 150). So I am taking the liberty of presenting here a few facts which may help to bring about some degree of clarification.

Butter has been making the headlines now for some time—at least for three years. Much has been said, both in and out of the press, by "leaders of consumers' rights," members of the butter industry, Congressmen and representatives of government agencies. Many of these statements conflict with one another—and with the facts.

Undoubtedly, the chief cause for much of the confusion is that many of the ideas are based on personal experiences or observations of conditions as they obtain in a local area. The nation-wide butter situation is chaotic. But it is simple to explain as compared with the countless local conditions. Yet the nation-wide situation is basic to the local problems.

At the outset, may I point out that in most instances when WFA or OPA has released figures on the butter supply—either the total supply or that available for civilians—they included both creamery butter and an estimate of the amount of farm butter. This has led to some confusion. For while farm butter is an important food commodity, it does not get into general commercial channels, and there is some question as to whether it should be considered as a part of the national supply. Much of it is consumed in the area where it is produced. And although some is marketed through butter-processing plants for industrial uses, it is safe to say that farm butter is not available to consumers in large urban centers. Creamery butter is the butter of commerce, and all government requirements for butter are taken from this supply. Hence, the plight of creamery butter is also the plight of the civilians' butter supply.

To understand this situation, we must follow the advice of the man who wore the brown derby and "look at the facts." Let us start with 1941, the last prewar year and the first year of government butter purchases as a part of the military setup.

Production Declines

There was a bumper crop of 1,872,183,000 lb. of creamery butter in 1941. The government purchased 81,000,000 lb. of this supply, leaving 1,791,183,000 lb. available for all civilian uses. Each year since 1941, there has been a progressive decline in total creamery butter production but a steady increase in government purchases. In 1945, creamery butter production will reach a long-time low of about 1,450,000,000 lb. It has been estimated that the government will purchase about 400,000,000 lb., leaving about 1,050,000,000 lb. for civilians—or about 58 percent of the amount they had in 1941 when their purchasing power was considerably less than it is at present.

Therefore, the crux of the whole situation is the meager total supply of creamery butter available for civilian purchase. The much-discussed black-market operations, the high point value, the markets without butter, and so on, all stem from this one basic factor. The solution to the problems can be found only in increased production of creamery butter!

Black-market operations in any commodity can exist only where there is an acute shortage. Produce an adequate amount of the commodity, or a satisfactory and readily acceptable substitute for it, and the black-market automatically fades out.

The purpose of rationing is to bring about an equitable distribution of a commodity which is limited in supply. An abundance of the product eliminates the necessity for rationing.

The point-value restrictions on buying a rationed commodity will vary inversely with the available supply. Thus during the past two years, as the available supply of creamery butter for civilians has decreased, the point value increased until it reached 24 points per pound.

Bad Point System

The rationing of butter has been complicated further by placing it on a red-point basis, together with cheese, meat, canned fish, shortenings and oleomargine. The relative merits of such a plan need not be discussed here except to say that it has added many complications to an already confused situation. The total number of red points awarded to civilians is based on the total available civilian supply of red-point products. The point values, however, are adjusted on the basis

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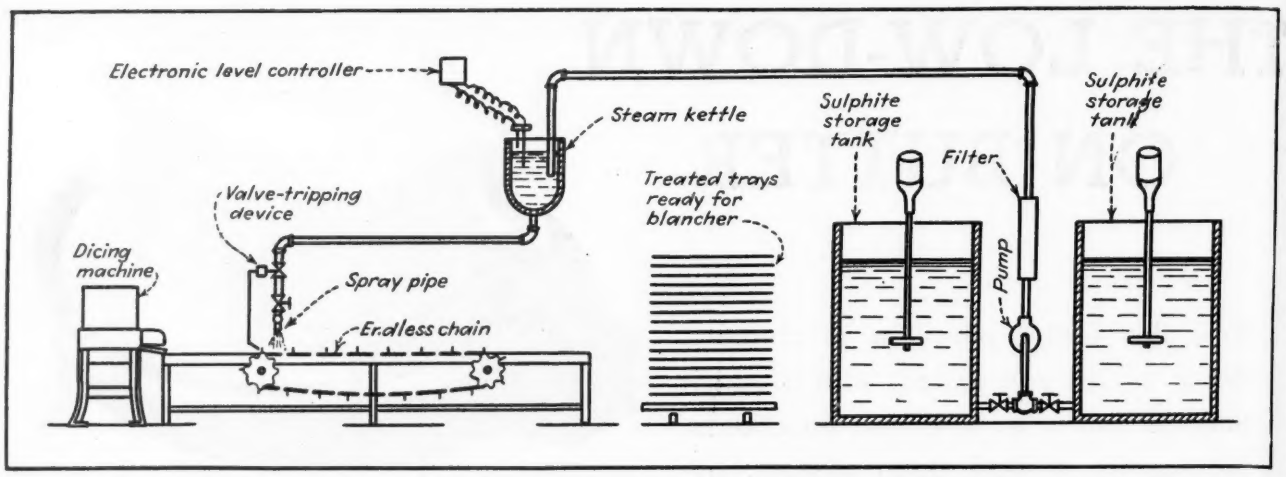
*Since this article was written, Mr. Ruehe has joined the faculty of the University of Illinois.



Equipment for sulphiting carrots before blanching.

Commercial Sulphiting Practices

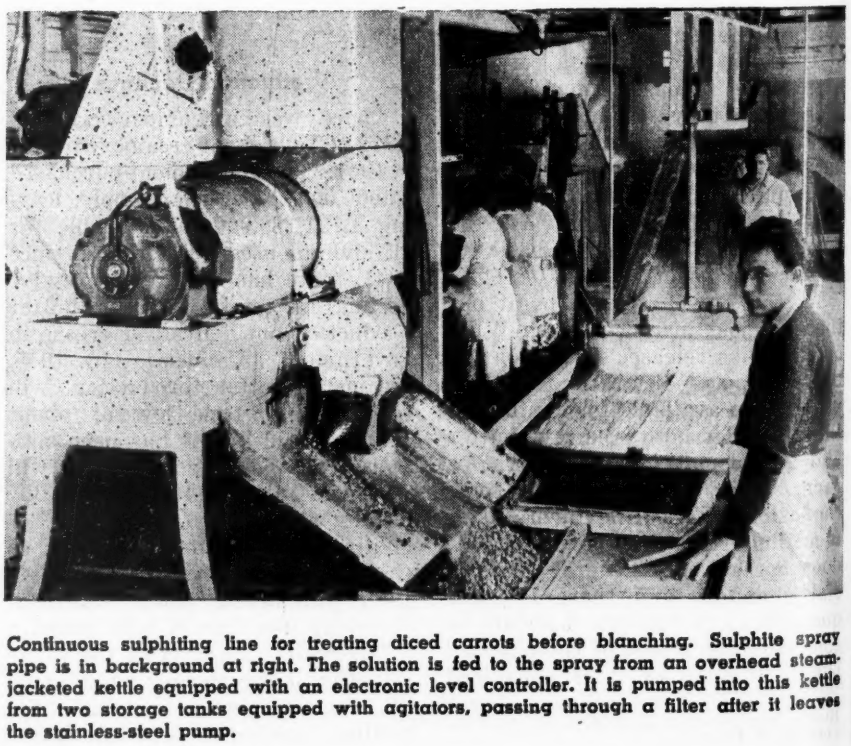
How dehydration plants in Southern California treat carrots and cabbage with sulphite solutions to retain flavor, color and vitamin content. Process and equipment are illustrated in a flow diagram

By E. A. BEAVENS and J. A. BOURNE

Fruit and Vegetable Chemistry Laboratory,* Los Angeles, Calif.

DURING World War I only a small portion of the dehydrated vegetables supplied to the Army were steam-blanched before they were dried. Some unblanched vegetables were shipped overseas at the beginning of World War II; however, it was not long before specifications of the Quartermaster Corps and the Federal Surplus Commodities Corp. required this pretreatment for all vegetables except onions. Quality tests made on unblanched vegetables sent overseas and held in storage showed that they were usually unfit for food, and in many cases the blanched products had deteriorated after 9 to 12 months of storage. In an effort to increase the retention of flavor, color and vitamins in cabbage and carrots, and to prevent natural seasonal discoloration in potatoes, the Quartermaster Corps specifies that these vegetables be treated with dilute solutions of sulphite. This treatment is in addition to steam blanching, before dehydration.

Several types of blanching equipment were in use by the dehydration plants on the West Coast, so it was necessary for each plant to develop its own method of applying the sulphite spray, and some interesting installations resulted without many changes or additions of equipment.

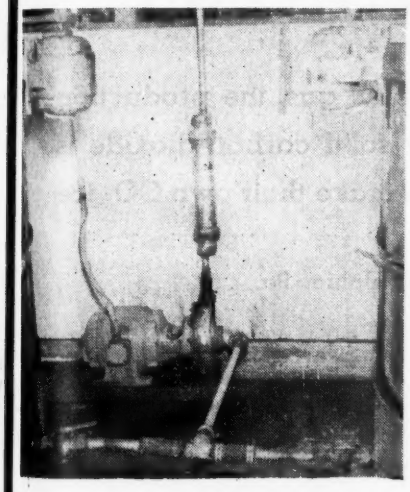


Continuous sulphiting line for treating diced carrots before blanching. Sulphite spray pipe is in background at right. The solution is fed to the spray from an overhead steam-jacketed kettle equipped with an electronic level controller. It is pumped into this kettle from two storage tanks equipped with agitators, passing through a filter after it leaves the stainless-steel pump.

*Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

Sulphiting Carrots

The sulphiting of carrots in a plant equipped with a cabinet blancher presented some problems, since this pretreatment would have to be done, before or after blanching, with some type of continuous spraying system. Pilot-plant experiments conducted in the laboratory on the sulphiting of cubed carrots before blanching had indicated that it was necessary to treat this material with a hot (190-200 deg. F.) sulphite solution with a concentration of 0.50 to 0.75 percent as SO_2. After steam blanching and drying, the finished carrots contained an average of 750 p.p.m. of SO_2. This method of sulphiting was successfully used in the carrot dehydration plant mentioned. The

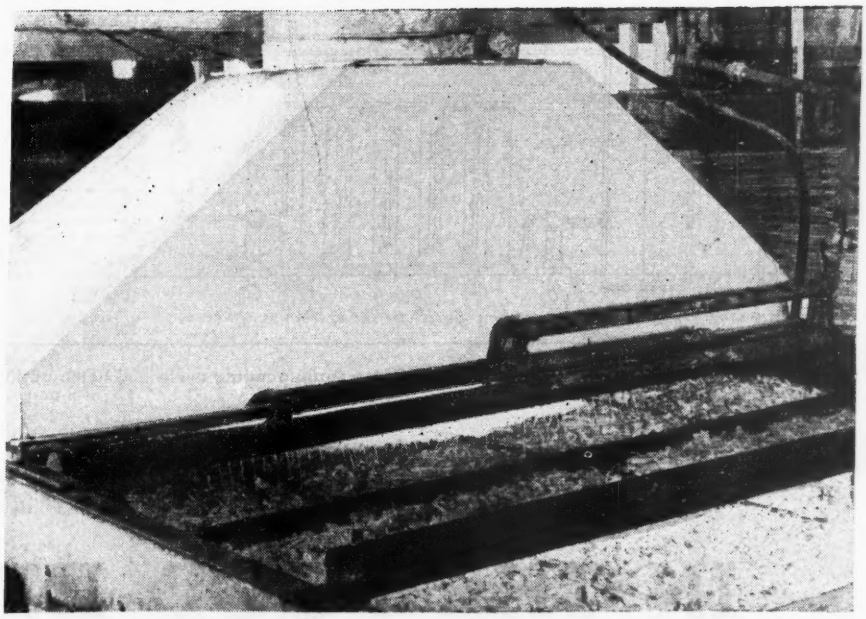


View of floor-level sulphite storage tanks showing stainless steel pump, filter, pipe connections and stirrer motors.

equipment is shown in the diagram.

Two 500-gal. wooden tanks were filled with the sulphite solution, consisting of equal parts of sodium sulphite and sodium bisulphite at pH 6.6 and a concentration of 0.57 percent as SO_2. These tanks were connected to a stainless-steel, steam-jacketed kettle 5 to 6 ft. above the spray pipe. The sulphite solution was pumped into this kettle by means of a stainless-steel pump, the level being kept constant by means of an electronic control unit. The solution was heated to 200-205 deg. F. in the kettle and kept at this temperature.

Sliding rails were extended approximately 25 ft. from the dicing machine, and a motor-driven endless chain 6 to 8 ft. long was installed between these rails to carry the loaded trays under the sulphite spray. A stainless-steel spray pipe 2 in. in diameter and perforated with three rows of holes was placed



Sulphite spray pipe installed at discharge end of continuous blancher.

across the rails near the end of the moving chain and connected to the kettle with sanitary hose. After the trays were filled, they were slid along these rails until they caught in protruding links on the moving chain. Then they were carried under the spray pipe where they released a trip mechanism that started the flow of hot sulphite. Each treated tray was moved along to the end of the rails and allowed to drain until the next tray came along. The trays were stacked on the trucks, steam-blanched in the cabinet blancher, and dehydrated.

Wooden-slat trays 3x6 ft. in size were used, and these were loaded with approximately 65 lb. per tray. Each tray was treated with 1½ to 2 gal. of sulphite solution.

This plant has used this method over a period of time and has had no difficulty in maintaining the SO_2 content of the dried carrots between 600 and 800 p.p.m.

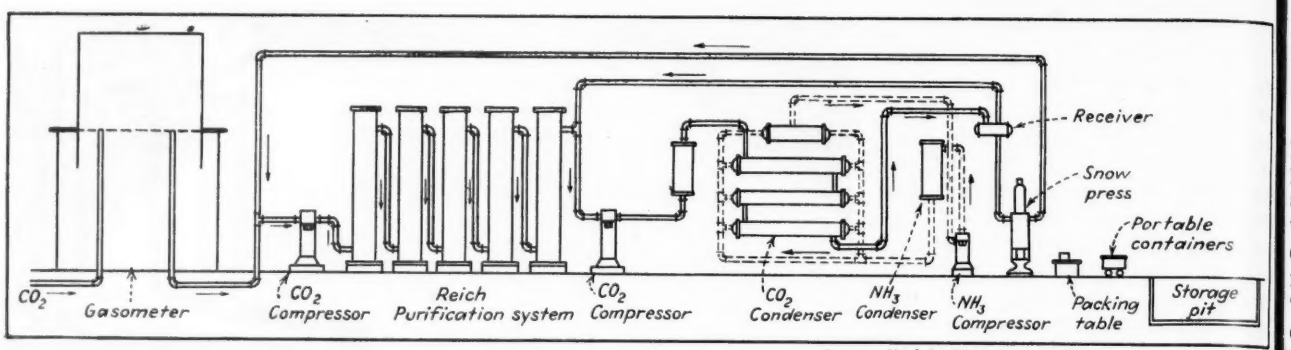
Procedure for Cabbage

The two cabbage dehydrating plants operating in Southern California use flat-type continuous blanchers. In the original installations, the sulphite spray pipe had been placed outside, at the discharge end of the blancher. The spray pipe in this position has several advantages over placement inside the blancher. The spray solution is always under observation, so that clogging or change in rate of flow can be checked quickly. The cold sulphite solution acts as an effective stop-blanch on the heat-sensitive cabbage. Although precautions were taken to allow the treated trays to drain before stacking, dripping from the wooden sides of the trays caused some staining of the cabbage. Because of this condition, one of the plants found it necessary to place the spray pipe approximately 10 ft. inside their 40-ft. blancher.

After many months' experience with the sulphiting of cabbage, the production manager of the plant was of the opinion that if corrosion-resistant trays were available, and the treated trays were allowed to drain before stacking, a better colored sulphited cabbage could be produced by applying the spray outside at the discharge end of the blancher.

The sulphite storage tanks have been erected on the floor level where they are readily accessible for cleaning and refilling, and the contents can be observed easily. The level of the solution in the supply barrel, placed above the blancher, is automatically held at a constant point by means of an electronic level-control device. And in one plant an automatic tripping device is used to start and stop the sulphite as each tray passes under the spray pipe. Slightly alkaline solutions (pH 7.2 to 7.8) consisting of 3 to 5 parts of sodium sulphite to 1 part sodium bisulphite, at 0.28 percent (as SO_2) concentration, were found to give the best colored cabbage after dehydration.

A small quantity (5 p.p.m.) of sodium hexametaphosphate was found useful in preventing the formation of an insoluble cloud and precipitate in the sulphite solution when made with hard water.



Courtesy York Ice Machinery Corp.

FIG. 1. Binary CO_2 ice manufacturing cycle and Reich purification process.

CARBON DIOXIDE IN THE FOOD INDUSTRY

PART II—Manufacture of CO_2 Ice—Starting with the purified gas, the production of which was described in Part I, the author tells how solid carbon dioxide is made. Some food processors may find it advantageous to make their own CO_2 ice

By GUSTAVE T. REICH, Consulting Engineer, Philadelphia, Pa.

TO discuss the thermodynamics of the various cycles for the manufacture of solid carbon dioxide would be beyond the scope of this article. If interested in that phase of the subject, the reader is referred to the excellent book by Quinn & Jones.[2] However, in all cycles the basic principle is that the CO_2 gas, which must be of the highest purity, is compressed and liquefied by cooling below its critical temperature. Above the critical temperature, no liquefaction can take place.

For cooling CO_2 prior to liquefaction, either water, brine or direct-expansion ammonia is used. Afterwards, the liquid CO_2 is further cooled by several means and expanded to a pressure below its triple point, which is —69.9 deg. F. At this temperature, as shown in Fig. 3, the carbon dioxide exists in three forms: gaseous, liquid and solid.

There are various cycles of compression and cooling, including "bleeding," "precooling," "binary," "pressure snow," "simple-type bleeder," "precooler" and many others. Each aims at producing the largest yield of solid CO_2 with the least amount of power. In this paper, two cycles will be described —the binary system and the three-stage compression cycle.

The primary cycle, in combination with the Reich fermentation-gas deodorization system, is shown in Fig. 1. After being scrubbed with water the gas is collected in a gasometer, compressed to 75-100 lb. pressure in the first stage of a compressor, purified, deodorized and dried before it passes to the second stage. This purification is necessary at this stage. When the CO_2 gas was prepared, as described in Part I, it was purified and deodorized at atmospheric pressures. But when the gas is compressed to 75 or 100 lb. pressure, traces of odor not noticeable at atmospheric

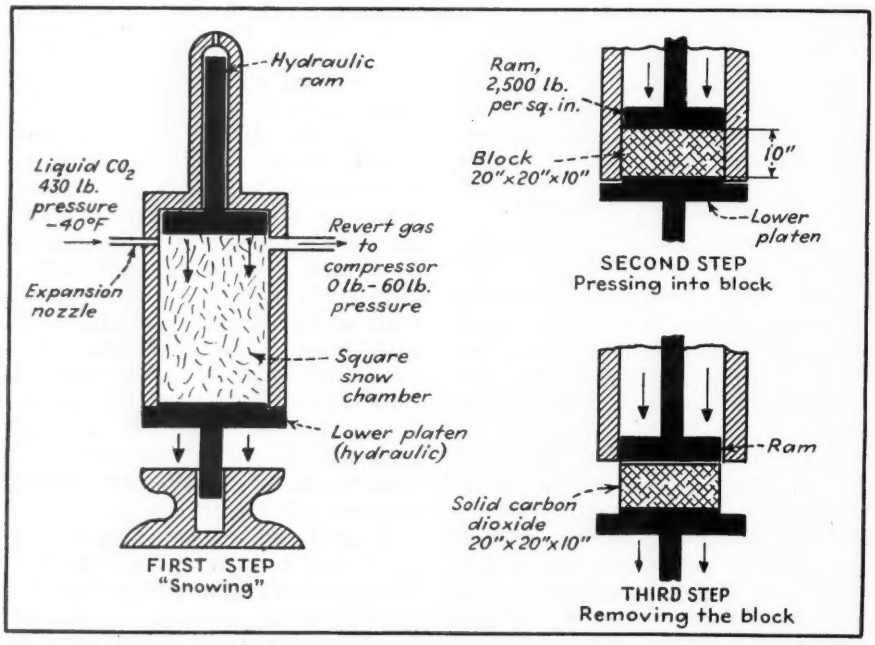


FIG. 2. Graphical presentation of the production of solid carbon dioxide in the snow press, showing "snowing," pressing and removal of block.

pressure become recognizable at the higher pressure, so further purification is necessary.

The purified gas is now compressed to about 430 lb., at which pressure it is led to an ammonia shell-and-tube condenser and converted into a liquid. After further cooling to —40 deg. F. in the liquid receiver, the liquid passes into the "snow press" (Fig. 2) where it is expanded to its triple point (Fig. 3). Part of it is converted into solid carbon dioxide "snow" while the cold gases, as shown on the flowsheet, are returned for recompression.

Two sets of three-stage compressors are used in the three-stage compression cycle (Fig. 4). One set is used principally to compress the raw gas. The other set handles the "revert" or "blow-back" gas from the snow press. In both sets of compressors, the gases are compressed to approximately 1,000 lb. pressure and are then combined and liquefied by cooling with water to below the critical temperature of 81.5 deg. F. Part of the liquid CO_2 is expanded in the precooler and intercooler, while the remaining CO_2 passing through two flash coolers reaches a final temperature of —40 deg. F. The conversion of the liquid into solid CO_2 is carried out at the triple point. In this process, the compressors handle only CO_2, and it serves as its own cooling agent.

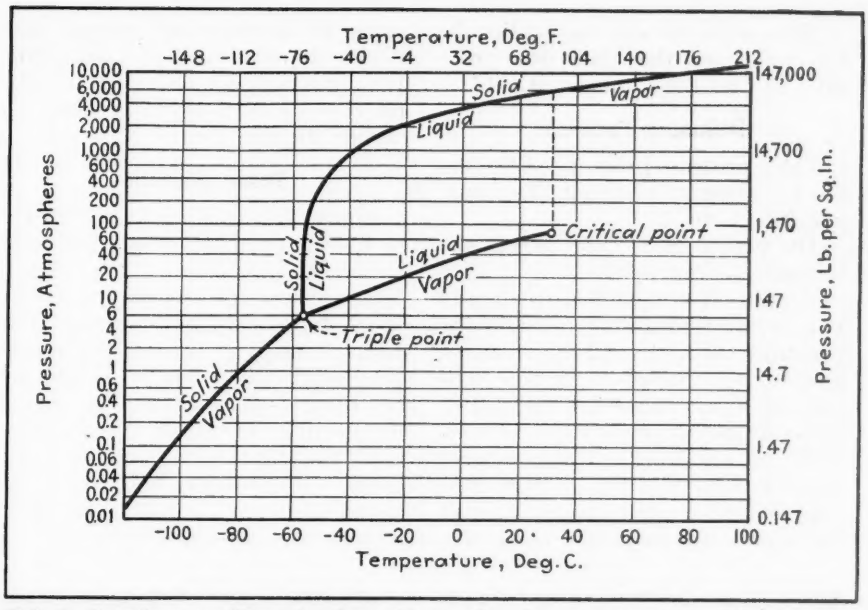
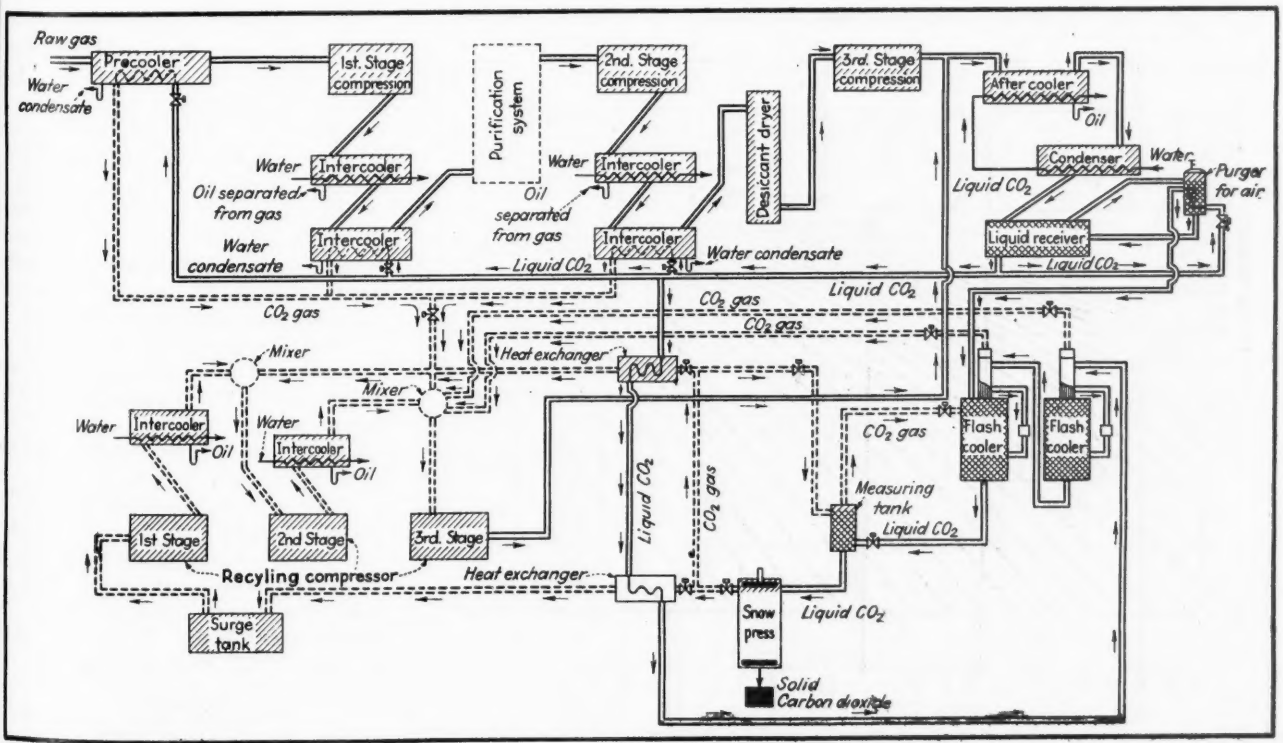


FIG. 3. Boundary conditions for the solid, liquid and vapor states of carbon dioxide. (By Cyril H. Meyers.)

Making Solid CO_2

For the manufacture of solid carbon dioxide, the liquid CO_2 must be cooled below its triple point (Fig. 3). There is an erroneous impression, held by many, that by expanding the liquid into a closed chamber all the gas is turned into a solid. Figure 7 shows the yield of CO_2 snow when the liquid CO_2 at various temperatures and pressures is expanded by reducing the pressure to one atmosphere.

To illustrate: If one pound of liquid CO_2 at a temperature of 75 deg. F. and at 120 atmospheres of pressure were expanded in a chamber to one atmosphere, there would be produced 0.30+ lb. of solid CO_2 snow. The balance of the liquid would become gas, to be reverted. On the other hand, if the pound of liquid CO_2 at 75 deg. F. were held at 64 atmospheres of pressure and expanded to one atmosphere, there would be produced only 0.26+ lb. of CO_2 snow. These two yields are indicated by arrows on Fig. 7.



Courtesy Worthington Pump & Machinery Corp.

FIG. 4. Three-stage compression CO_2 ice cycle.

This principle can be applied in two ways—as the "diffusion process" and as the "press method."

Diffusion Process

This process produces CO_2 ice blocks without pressing the crystals into a mold.

The procedure is described in the following paragraphs:

A measured quantity of liquid CO_2 is fed into a chamber and the pressure reduced until the required quantity of crystals is formed. The gaseous CO_2 formed is withdrawn through an opening at the bottom. This is followed by a measured quantity of liquid CO_2, which cools while flowing downward through the crystals previously formed. Because of the drop in pressure, part of the liquid is evaporated, while the new crystals obtained thereby fill the voids to form a block of carbon dioxide ice.

Press Method

Liquid CO_2 at pressures of 430 to 1,100 lb. and at various temperatures is expanded in a vertical hydraulic press chamber through specially constructed orifices. The press is open at the bottom and is provided with a platen which can be raised or lowered for closing or opening the press. A ram inside the chamber compresses the snow. The lower platen of the press is raised by means of liquid from a low-pressure pump so as to seal the snow chamber hermetically. Then the liquid CO_2 at a certain pressure and temperature, say 430 lb. and —40 deg. F., suddenly is expanded below its triple point in the snow chamber. As the temperature drops, part of the liquid CO_2 is converted into CO_2 snow at a temperature of —110 deg. F. It falls to the bottom of the chamber, while the remainder, in gaseous form, is drawn off and returned to the compressors for recompression. The gas, returned to 20-35 lb. pressure in some cycles, is recompressed in one step to 375 lb. pressure. In other cycles, it is mixed to cool the raw gas entering the first stage of the compressor.

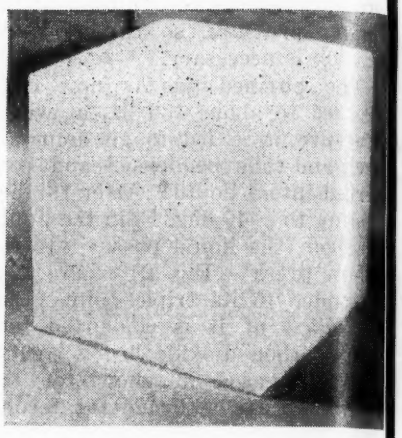


FIG. 5. Ten-inch cube of solid CO_2.

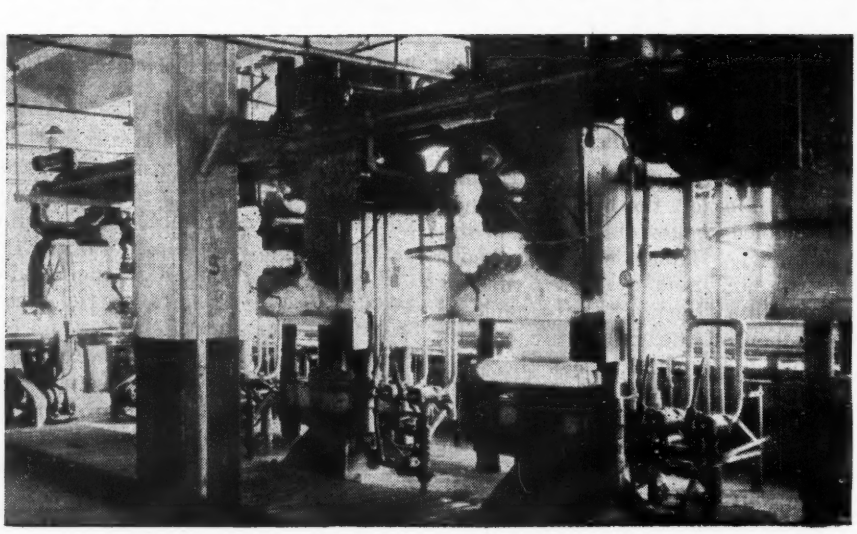


FIG. 6. Hydraulic presses capable of making 100,000 lb. of solid CO_2 in 24 hours.

When a predetermined amount of liquid has been expanded and the right amount of snow is formed, as calculated, the liquid feed is interrupted and the upper ram inside the snow chamber is moved downward, gradually raising the hydraulic pressure to 2,500 lb. per square inch. The combination of the proper amount of liquid fed, correct length of time, and release of gaseous CO_2 from the snow chamber at the proper pressure results in the deposition of a sufficient amount of snow to produce solid carbon dioxide blocks.

After compression, the platen is lowered and the solid block forced from the snow chamber by the upper ram. A block of the CO_2 ice is shown in Fig. 5 before being packed in kraft paper.

Figure 6 shows four hydraulic presses capable of producing 100,000 lb. of solid CO_2 per 24 hours. The standard commercial size of cake is a 10-in. cube weighing approximately 55 lb. The 20-in. cake usually is cut into 10-in. blocks.

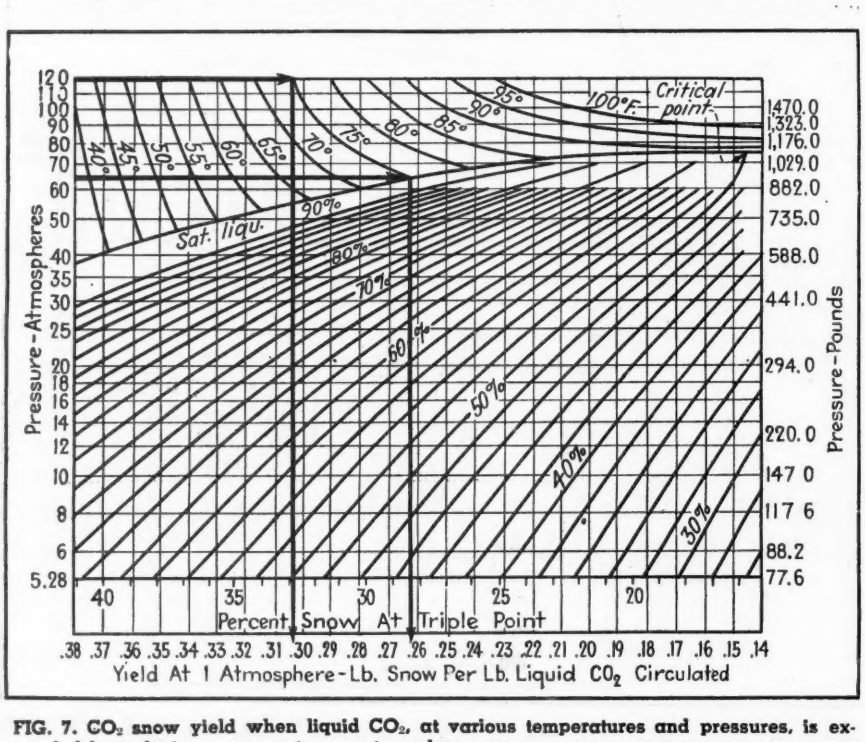

Pressure - Atmospheres
Pressure - Pounds
Critical point
100°F.
Sat. liqu.
Percent Snow At Triple Point
Yield At 1 Atmosphere - Lb. Snow Per Lb. Liquid CO_2 Circulated

FIG. 7. CO_2 snow yield when liquid CO_2, at various temperatures and pressures, is expanded by reducing pressure to one atmosphere.

References

1. A. B. Stickney, *Refrigerating Engineering*, vol. 23, 334-42, 1932.
2. Quinn & Jones, Carbon Dioxide, Reinhold Publishing Corp., New York, N. Y. 1936.

EDITORIALS

LAURENCE V. BURTON, Editor

Atomic Power

THE much publicized atomic bomb and atomic fission is at present a very violent and explosive form of energy. If it can be controlled so that the release of this energy is gradual and can be put to useful instead of destructive work, if it can be obtained at a cost that is competitve with other known forms of controllable energy, if the capital cost of an atomic energy power plant is not prohibitive—a lot of important if's—then atomic power may have application in food processing.

It is far too early to even speculate on its possibilities as a processing agent like ultraviolet or supersonics.

It may or it may not prove useful in the food industry. But all will follow this spectacular discovery with anxiety and great interest.

Watered Milk

THANKS to OPA methods of pricing, farmers in certain areas are finding it profitable to "standardize" the fat content in their milk by adding water to bring the fat content to the optimum percentage for maximum price return. We have been unofficially informed that more than half of the milk coming to a certain large city has been "adjusted" via the water route, and that the amount of water added amounts to about 3 percent of the entire city milk supply.

The city most concerned is taking active steps to combat the situation, which of course adds to the cost of milk by further expenditures from taxes. It is cited here as a factual example of the need for more and more controls as soon as a nation embarks on a managed economy.

Distribution Costs

STUDIES by the Storrs Agricultural Experiment Station point to potential economies in fluid milk distribution. In Hartford, Conn., it is estimated that alternate-day delivery of fluid milk would reduce truck costs from about 1.8 cents a quart for retail deliveries and 0.91 cent for all deliveries to 0.72 and 0.62 cent, respectively. And if the market were zoned into exclusive delivery areas, alternate-day delivery would result in truck costs of 0.36 cent a quart. If these loads were increased to 600 quarts, the figure would drop to 0.27 cent.

It is no secret that some officials in the Department of Agriculture think that food distribution costs can, and should, be reduced. So, food processors may have more pressure applied in that direction than comes from economic factors alone.

No News on Italian Food Industry

ONE of the oldest gags of newspaperdom is the tale about the country editor who wired to a city daily that there was no possible news story about a big train wreck, for everything was in confusion. We never believed that we would actually see its counterpart in technical publishing, yet here it is:

"It was stated (by the Italian Government High Commission for Alimentation) that the food industry, being now in a chaotic state, it would hardly be possible for any one, in spite of all good will, to compile thorough and reliable information with regard to it."

Nothing Is So Costly as Failure

FOOD INDUSTRIES has repeatedly called attention to the statement that nothing is so costly as failure. The occasion for repeating it here is the Potsdam Conference. Germany is to be a third-rate economic power, henceforth. The principal activities of the would-be supermen will be agricultural and a modest amount of manufacturing plus exploitation of mineral resources that happen to lie beneath German soil.

It is unnecessary to dwell on the calamitous defeat that the Germans so richly deserved. The chief comment is on the frightful cost of failure in any undertaking. Had Hitler conducted the necessary researches before embarkation on his dream of world conquest instead of depending on the say-so of a poorly informed wine salesman, he would have known that he would have had to fight most of the world, he would have been better aware of competitive arms production, and he might have foreseen the folly of his decisions.

Research and more research—not only in science, but in the fields of engineering, economics, population trends, legislation and a host of lesser fields—are indispensable for business success. Lacking proper data on which to base sound decisions, the green light may be given to a course of action that can lead to disaster.

Proof That Unions Are Wise

MONTGOMERY WARD & CO. affairs have been in the news for so long that there is no need for explaining them here, except to point out that their first-quarter profits, before taxes, were 60 percent higher than in 1944 and that net profit, after taxes, was $5,000,000 compared with $3,400,000 last year, with sales 18 percent higher.

You will recall that CIO unions have been moving in on the company, not without consider-

able aid from government labor agencies. The important feature of the affair to remember is that CIO seldom goes after a company until economists have made a thorough study of the firm's affairs and have decided that the profit position of the company warrants union action. Which is not to debate the questionable methods the government has employed, nor to comment upon the company's reactions.

Management must learn that many unions are not economic ignoramuses. In fact, some labor leaders of our acquaintance are better informed about business in general than some business men. Both groups seem to be motivated by one common purpose: to beat the Treasury to the profits.

Why This Segregation?

A MAP of the United States showing the percentage of selective service registrants that are classified as IV-F reveals some amazing facts. The national average is 18.5 percent but, with the exception of one state, Vermont (20.5 percent IV-F's), all the highest rejections are south of the Ohio River and Missouri and Kansas. Oklahoma is 20.6 percent, Mississippi is 20.2, Texas 21.1, Alabama 24.9, Florida 24.7 and South Caroline 30.2. There are no states with lower than 20 percent rejections in this area.

What it means is very conjectural. It may be the result of poor nutrition, communicable diseases, or it may be racial in origin. But this startling segregation of high disability among young men calls for vigorous investigaton.

Future of Philippines

WHAT IS to become of the Philippine Islands concerns the food processing industry and agriculture more than any other segments of the American population. Theoretically, the Filipinos are to gain complete independence in another year. A Federal statute, enacted some years ago, grants that independence. But after their recent experience under Jap domination, many of their leaders are doubtful of the widsom of complete independence from U.S.A. The Independence Party in the Philippines is seemingly a minority party today. And to be realistic, certain food and agricultural groups in America were far more potent for effectuating Philippine independence than the Filipinos themselves ever were.

No American has any desire to keep any other people in subjugation. With all our faults we have no desire for more territory, as such. Nor with all our materialism do we want to exploit other people. Yet we soon must face an important political problem: Shall we or shall we not force complete independence on the Philippines?

Those Americans who have advocated independence most vociferously have been motivated by the idea that Philippine sugar and coconut oil must be kept out of this country at any cost. (What wouldn't we give for 20 shiploads of that oil today?) Ditto for Philippine sugar, which used to arrive at the rate of a million tons a year.

Yet America needs military bases in the Philippines for security reasons. It is freely acknowledged in New Zealand and Australia that the crying need in the future is for America to maintain stability in the Pacific by a strong fleet—that Great Britain is too far away in time of need. If we are to maintain peace in the Pacific we must have bases, even in the Philippines. And the Filipinos are not averse to such a deal. But it cannot be made without concessions on both sides.

On our part we will probably need to admit imports from the Philippines either free or with a very small import duty. Which will cause violent outbursts of disapproval from those who will be in competition with such imports. To all who believe they will be hurt by Philippine exports to the U.S.A. without tariffs, we should like to quote an outburst from an Australian in 1944 when this matter was under discussion.

"Of course, peace costs money! But war costs *infinitely more!* Is America willing to pay the cost of peace! Or does it again want to pay the ruinous cost of war?"

FOOD INDUSTRIES is "sold" on the idea of paying the lesser cost of peace. We believe that some economic sacrifices must be made to security. Individually and collectively we will be better off in the long run.

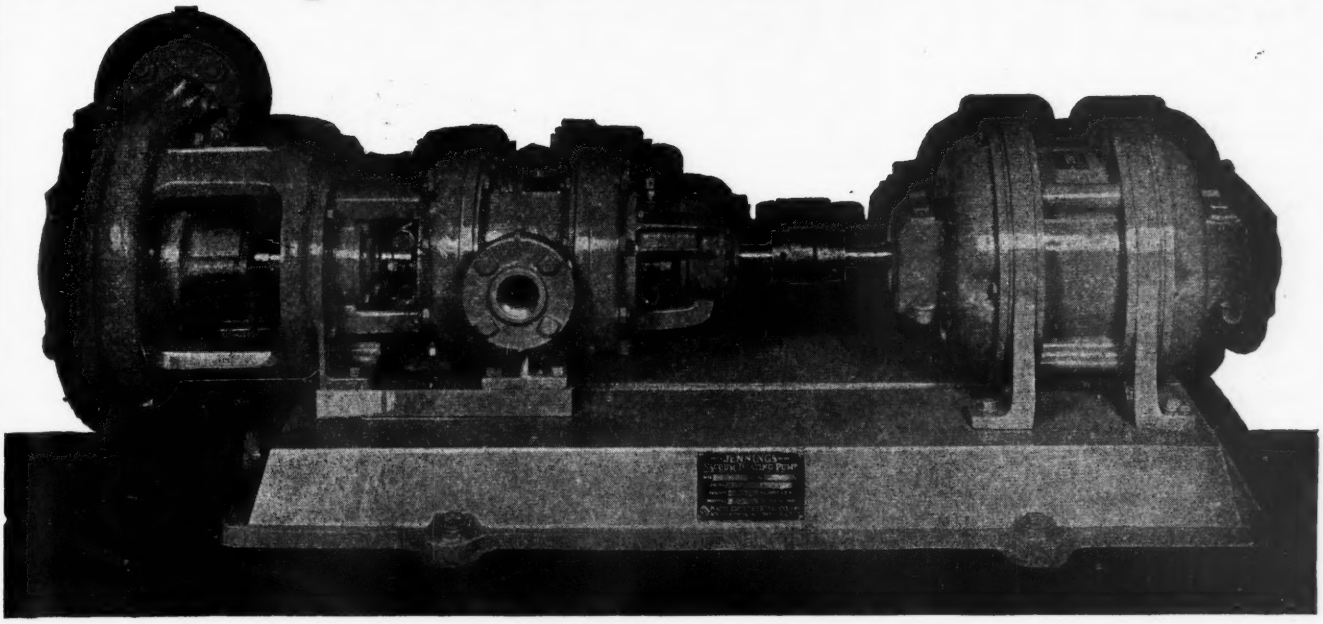
For Better Flavor

AFTER a lifetime in the food industry, one manufacturer has reached some interesting conclusions: "People eat first what they like and enjoy, health considerations being entirely secondary. The majority will eat something they like even if they know it will harm them. A small minority will continue to eat something they believe is good for them but which they do not like. Good flavor is the most powerful basis for appeal to gain and hold a market."

If food manufacturers are seeking a profitable line of investigation by their research departments, the matter of flavor retention or improvement is one that merits a prolonged study. It will, however, lead into physiology, psychology, chemistry and engineering. While it is possible that "messing around"—third-grade research—may lead to flavor improvement, the potential rewards are great enough to justify employing the best possible talent, and doing the best possible job.

If, perchance, a food manufacturer is fearful of the Leftish tendency of the times, good—nay, superlative—flavor is something that the most confirmed Marxist would not deny as a real service to humanity.

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

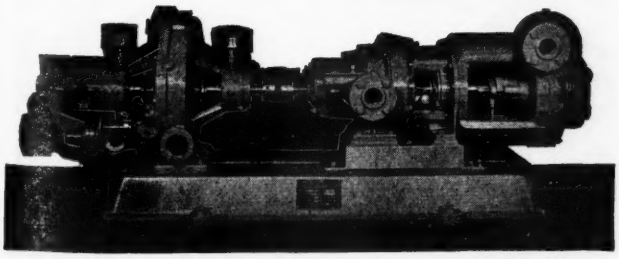


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

NASH ENGINEERING COMPANY

SOUTH NORWALK · CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

Tea Choice

FOR many years, Stephen Leeman Products, Teaberryport, New City, N. Y., has made its teas available in "sampler" selections, so that each customer can learn his own preference among the types of tea offered. The company is now restyling its packages.

One attractive selection is the Ming Tea Party, containing 2 oz. each of Ming Cha, Ceylon, India and Matte Brazil. Square-sided chipboard cans with blackplate ends hold the teas, each variety having a tightwrap in a different color of glazed surface paper. The four cans are held in a light cardboard tray with a cellophane wrap. The labels are in gold and black, with a touch of red in the coat of arms.

Toffee Sauce

A HEAVY emulsified sauce, smooth, and with the texture of real toffee, is made by the C. S. Allen Corp., Webster, Mass., in chocolate, caramel and Rumbutus flavors. The sauce can be used over waffles and pancakes, hot or cold on ice cream, in milk shakes or as an ingredient in cookies and frostings.

Sugar, corn sirup, sweet condensed skim milk, hardened vegetable fats and artificial flavors are used in making the product.

Folding cartons protect the glass jars with metal screw caps. Both jar label and carton have a black background, printed in yellow and orange. Because of the newness of the product, suggested uses and recipes occupy panels on three sides of the cartons.

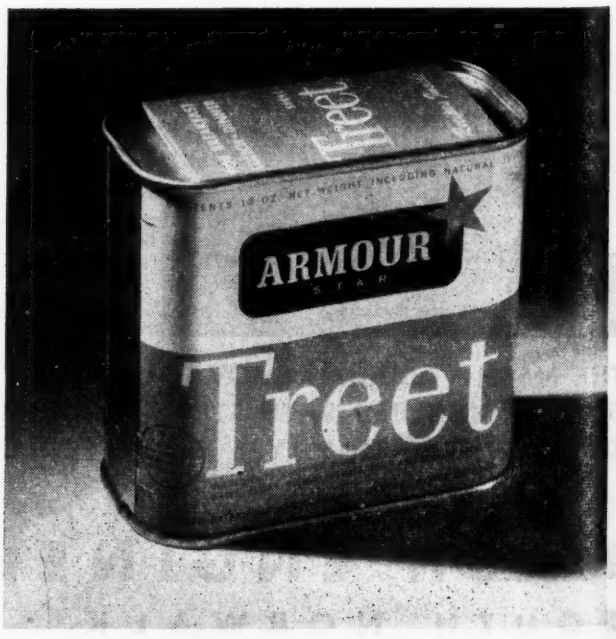
Treet Restyled

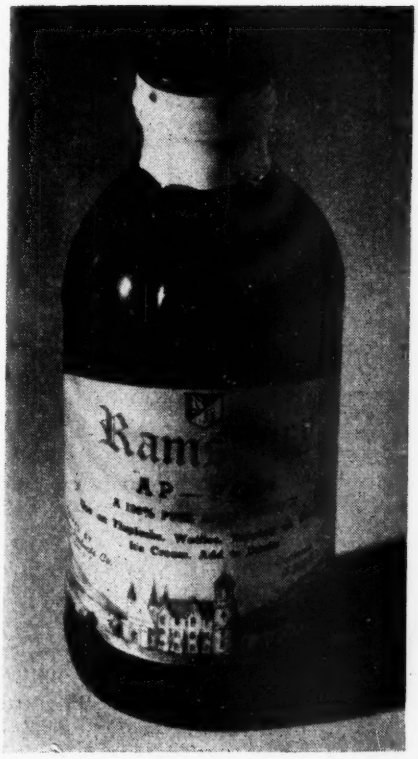
ARMOUR AND COMPANY, Chicago, has begun a changeover of all of its labels. First on the store counters is the familiar Treet, pork luncheon meat.

For this, the lithographed can is in claret red and white. The new Armour name panel is in white on maroon.

On the reverse of the 12-oz. key-opening can are pictures of two suggested ways to serve the product.

Elements of the design will be the same for all Armour products, the color of the star and the predominating color of the label being varied for each product.





All Apple

RAMSBURY AP-POM is a pure apple concentrate, without any added sugar or preservatives.

Packed by Brighton Products Co., New York, the sirup is ready for use as a sauce on desserts, as a sirup for flapjacks, or as a sweetener with fruit and fruit drinks.

It comes in 8-oz., 16-oz. and 1-qt. bottles. A four-color label in pleasantly muted colors is designed to express the quality aspect of the product, a suggestion carried out also in the use of a white plastic sealing band around the cap.

Western Sweetener

HONEYVILLE, Monrovia, Calif., is shipping Real California Avocado Honey to markets learning to use new and interesting sweeteners. This is a very dark honey, of medium viscosity and a pleasant flavor. The pound jars carry small gold and green labels.

Rummier

DARK FRUIT CAKE slices are bathed in rum and sealed in 6-lb. glass jars by Affiliated Bakers Co., New York.

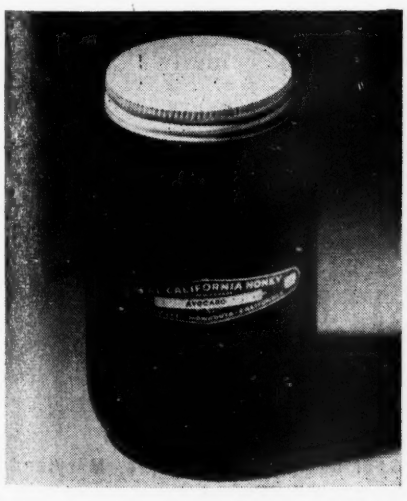
Fruit Cake Rummies, according to the tan and maroon label, contain raisins, sugar, eggs, nutmeats, diced fruits, dextrose, honey, flour, shortening, skim milk powder, cherries, spices, salt and artificial flavor, as well as the rum.

Over the Salad

AVOCADO enters the salad in a new form in avocado oil dressing.

The dressing is made with the avocado oil and wine vinegar, sweetened with honey. It contains rather coarsely ground spices. Gum tragacanth is used as a stabilizer.

A yellow background, lightly crosshatched in white, with green lettering, makes a label that contrasts well with the dark amber dressing. It comes in 8-oz. and pint bottles. The Ard Co., Los Angeles, Calif., is the manufacturer.

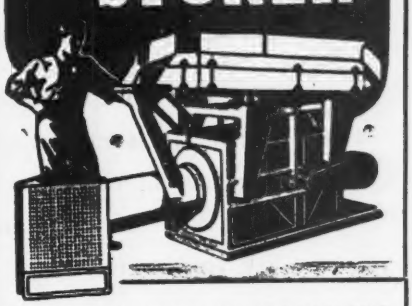


No More $TONE$ in Your Bottle-Neck!

• Now, with critical war shortage of labor, streamline STONING in your mill. Removing stones has always been slow, laborious and costly out of proportion to other steps in processing cereals, soy beans, and other dry foods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic metals, and all other hard, dangerous contaminations from cereals, soybeans, and other beans, and other food products with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour.

Write for Bulletin FI-945

SS&S AIR-FLOAT STONER



SUTTON, STEELE & STEELE, INC.
DALLAS, TEXAS
In Canada—Kip Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign—Separations Engineering, Ltd., 133 Bush House, Aldwych, London

"He *says he likes them seamless'*

WE'RE in no mood for arguments with the hosiery trade. All we know is that the Crowntainer, a seamless can, made a hit the moment we put it on the market.

The Crowntainer is actually a steel bottle. It is far stronger than ordinary cans. And because of its shape and type of construction, its uses are innumerable.

The Crowntainer is further proof of "cangenuity"—Crown's ability to combine ingenuity with can-making skill and experience. This ability is a source of profit for you. Nor is it limited to the production of new kinds of containers; it has many applications of benefit to can users. If you wish a sample, just tell us your problem.

CROWN CAN

INDEPENDENT AND HELPFUL

CROWN CAN COMPANY • NEW YORK • PHILADELPHIA • Division of Crown Cork and Seal Company, Baltimore, Maryland

FOOD INDUSTRY NEWS

Agriculture Dept. Is Reorganized

New setup, which is along commodity lines, will simplify dealings with the department

THE long-expected reorganization of the Department of Agriculture was announced last month. The new setup, which is along commodity lines, should simplify all dealings with the Department, as it will no longer be necessary to contact several different branches on problems affecting a single commodity.

Under the reorganization, the Agricultural Adjustment Agency is abolished and a new overall agency is established to be known as the Production and Marketing Administration. This agency will have ten commodity branches and nine other branches, including a field service branch, which will carry on the activities formerly performed by AAA. Secretary Anderson says that under the new setup, Triple A activities are really being expanded and tied closer to the farmer through the new branch.

Under Secretary J. B. Hutson will be the administrator of PMA and also will take over his old job as president of the Commodity Credit Corp. While Frank Hancock retires as president of CCC to devote full time to the administration of FSA, most other top officials retain their jobs in the new lineup.

Bright Future Expected For Frozen Foods

QUICK FROZEN food offers the best possibility for postwar development in the food processing industry, according to a report made by the National Industrial Conference Board, which also declares that production of frozen foods in general is the fastest growing branch of the industry.

At present, the output of quick frozen foods is far less than that of the other frozen food divisions, the report states, but developments carried out since 1941, including the preservation of precooked meals, seem to assure rapid postwar expansion. This is especially true in the expansion of retail sales.

In 1944, commercial truck crops for 25 commodities produced 15,700,000,000 lb. for the fresh market, while somewhat less than 7,000,000,000 lb. was produced for processing. Of this about 500,000,000 lb. was frozen and only a part of this was quick frozen.

The report asserts that the tendency has been away from home preservation, including home freezing. If frozen locker plants are available and frozen food is offered, neatly packaged, by the corner grocer, the effect upon the home-freezing industry probably will be considerable.

Little Effect Seen In New Freight Rates

THE ICC ruling cutting freight rates in the South and West will have no real effect, in the opinion of Senator Stewart, of Tennessee, because it applies only to class rates, which are a very small portion of the rate structure.

It remained to be seen, the Senator said, whether the rate change would go into effect, since eastern shippers and state governments are preparing to fight the order. Even if it does, he continued, southern class rates, after the 10 percent reduction, will still be 14 percent higher than eastern rates, southwestern rates will be 32 percent higher than eastern rates, and western rates will be from 5 to 32 percent higher.

Senator Stewart's opinion coincides with those expressed by members of the food industry.

2-Day Package Conference Set

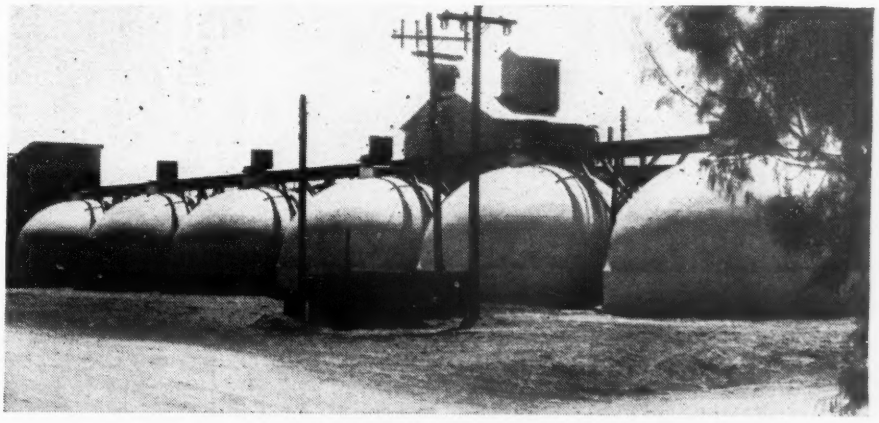
Experts will discuss problems submitted by industry. Date is Sept. 18-19. Place, New York

A TWO-DAY Packaging Conference, first meeting of the American Management Association's 1945-46 conference season, will be held September 18 and 19 at the Hotel New Yorker, New York City. As restrictions on travel necessitated cancellation of the Packaging Exposition and Conference scheduled for last spring, the meeting will be the first held by the association's packaging division since March, 1944.

If travel regulations still require it, attendance will be limited to those living or working in the New York area, but as in the case of the national meetings the association has held in the past, sessions will be open to nonmembers.

Featured will be a packaging-problems session, at which experts will discuss problems submitted by the membership. Included on the panel will be Martin Ullman, industrial designer, New York; F. S. Leinbach, assistant to the general manager, Riegel Paper Co., New York; Stanley Burnham, container department, Merck & Co., Rahway, N. J.

The topics to be discussed include peacetime possibilities for "V" and "W" boxes, and changes in Army and Navy specifications.



BUILT ON AIR

Concrete was placed over an air form in building these grain-storage buildings at Litchfield Park, Ark. First, a 4-ft. concrete sidewall was built, being reinforced with steel rods. A balloon was then inflated inside the sidewall, ordinary chicken wire was stretched over the balloon, and the wet concrete applied. The chicken wire is the only reinforcing in the dome. These buildings, along with residential structures, are part of a Goodyear Tire and Rubber Co. experiment.

Army Ends Contracts For Dehydrated Foods

A REDUCTION of 80,000,000 lb. of dehydrated food is called for in plans announced by the War Department late last month. This represents about a 40 percent cut in the over-all total that the Army had scheduled to take from 1945 production.

Contracts for canned processed cheese, totaling 600,000 lb., dehydrated onions, totaling 4,883,000 lb., and dehydrated carrots, totaling 1,604,000 lb., were cancelled outright. Earlier termination of contracts for 9,634,000 lb. of dehydrated sweet potatoes and 63,997,000 lb. of dehydrated white potatoes was rescinded pending transfer of the Army's contracts for these two items to other government agencies. Cancellation was expected to follow soon after the transfer.

Freezer Jam Threatens California Peach Pack

THE sudden end of the Pacific War brought no immediate relief in the shortage of refrigerator cars on the West Coast, although some lessening was looked for as west-bound shipments of war materials and troops eased. Before the Jap surrender, the demand for refrigerator cars had gone up approximately 12 percent, on the Coast, while the supply was down about 20 percent.

Meanwhile, perishables stored by the armed forces in freezer storage, plus the completed California apricot frozen pack, had jammed all available freezer space in California. Unless some of these perishables can be moved, the plans of packers to freeze between 15- and 30,000,000 tons of California peaches will run into trouble.

Food Equipment Buying Looms Large in Survey

MANUFACTURERS of groceries and kindred products, who have a larger volume of sales than any other industrial group in America, will spend well over $600,000,000 in the next year for new machinery and other capital equipment, according to Paul S. Willis, president of Grocery Manufacturers of America.

Mr. Willis' figures were based on a recent survey made by the Bureau of Foreign and Domestic Commerce, which showed that all industry planned to spend a total of $9,000,000,000 on capital equipment in the coming year.

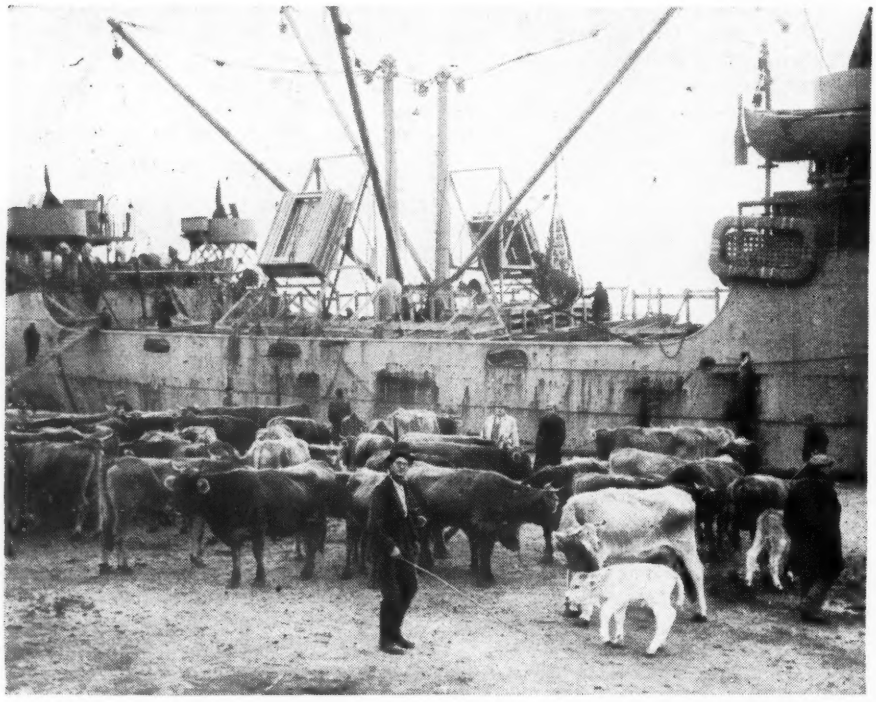
FAO Preparing for First Formal Meeting

AMERICAN adherence to the international agency, Food and Agriculture Organization, was voted by Congress before it left for its abbreviated recess. Thus the Interim Commission felt justified in proceeding on plans for the first formal meeting of that new international body, which is expected to be held very soon.

Of the 45 countries represented on the Interim Commission, well over half have voted formal membership, so that a complete organization seems certain. The interim body is headed by L. B. Pearson, Canadian ambassador to the United States, as chairman, with Gove Hambidge of Agricultural Research Administration as executive secretary. This temporary group will, of course, go out of existence when formal organization has been perfected. At that time FAO will become one of the subsidiary parts of the United Nations on the same status as International Labor Office.

Association Grows

SIXTY-FOUR ice cream manufacturing companies and eight supply firms joined the International Association from October 1, 1944, to June 30, 1945. The International Association has enjoyed a constant growth in membership the past several years, 110 companies having joined in 1942, 107 in 1943 and 63 in 1944.



Three Lions

CATTLE FOR ITALY

The Italian government is making every effort to restock its war ravaged areas with cattle, sheep and horses. An exportable surplus in Sardinia made this shipment possible.

Opportunity

There is an opening for an **engineer** on the editorial staff of FOOD INDUSTRIES. Journalistic experience is not necessary, but the man selected must have had engineering experience in a food processing plant, preferably a university-trained engineer—mechanical, industrial or chemical engineer.

We believe the man we are seeking has had some experience in designing equipment, operating a department in a food plant and is generally familiar with solving production problems by his own resourcefulness. He is more interested in engineering than in chemistry. He has a likable personality and gets along well with all kinds of people. He is thorough; when he writes a report, his superiors do not have to send him back for more data. He has a questioning mind. He enjoys writing a report.

The man we seek has had from 4 to 10 years of food plant experience and is under 35. The work is challenging, the surroundings ideal, associations stimulating and the future is bright.

The location is New York, but the man will be asked to travel extensively. This is an excellent opportunity for a young man who really wants to grow.

If you know of such a man, please ask him to write his qualifications and send his salary requirements and his photo to the editor of FOOD INDUSTRIES, rather than call in person. Replies will be treated confidentially.—THE EDITORS.

Inertia—the tendency of anything to stay put

• Funny thing about inertia:

It can creep up on you from one angle while you're busy with another aspect of a problem.

For instance: You have been improving your product during the years. Wartime research and new developments have assured your product's future progress. No inertia here, all right, BUT—

Don't overlook your package

What about your container? Are you certain that it is a help to your product? Has it stayed put while you were busy improving your product?

Test the effectiveness of your package with these three questions: Is it economical? Is it efficient? Is it attractive enough to make the consumer point it out with a decisive finger?

Our job at Canco

We're here to help you answer these questions with a big "Yes!"

Our specific job is to devise packages attractive enough to accomplish these three requirements and accomplish them *well*. We are qualified to do this because of years of research and service.

Why not get the latest information? So that we may lend a hand, extend one . . . by asking our representative or writing us direct.

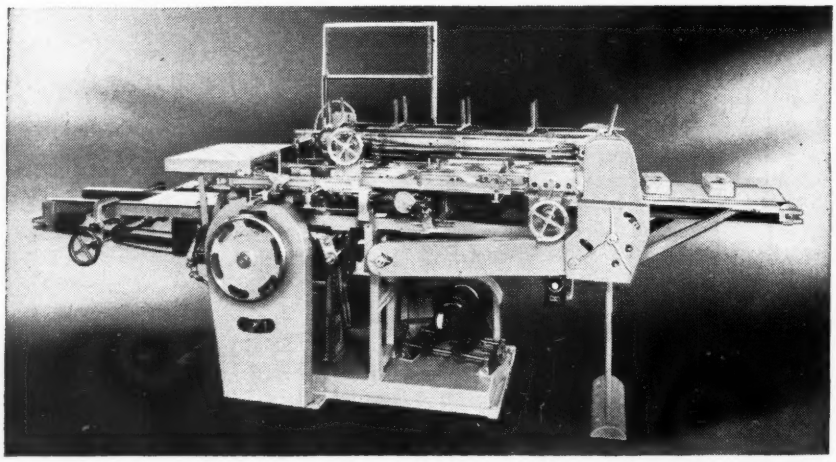
CANCO

AMERICAN CAN COMPANY

230 Park Ave., New York 17, N. Y.

WORLD'S LARGEST MANUFACTURERS OF FIBRE AND METAL CONTAINERS

Out of the War has come
A NEW FA MODEL



A WRAPPING MACHINE

that sets a new high in perfection of wrapping . . . in speed . . . flexibility and mechanical efficiency

Long the most popular wrapping machine in the package goods field, the FA has been widely employed in meeting war needs . . . This extremely wide use has proved its fundamental merits. Moreover, it has provided our engineers with a wealth of *practical data on which improvements could be based.* The present FA is the result.

Here's a machine that will wrap up to 100 packages per minute . . . is suited to any type of wrapping material in roll or sheet form . . . can accommodate not only an ordinary carton, but open boats or flat objects on a cardboard. And it can be supplied to handle many different package sizes. Some machines now being built will accommodate as many as 10 different sizes.

Mechanically, the new FA is more rugged than ever . . . quieter in operation . . . easier to supervise . . . and it occupies less floor space. Refinements conducive to easier operation and better wrapping include: a new type paper feed; new glue pots that are easier to clean and permit the use of any type of glue or cellosolve; new spring-floating heater units; a new and more sensitive paper stop that prevents light packages from tipping; a new transport mechanism that permits shorter discharge belts; and new folding box which makes it easier to adapt an existing machine to a new package size.

If you are looking forward to more efficient postwar wrapping and a package that has new "come-on", you should know all about this new FA model.

Write for our FA leaflet.

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts

30 Church St., New York 7 • 111 W. Washington St., Chicago 2
101 W. Prospect Ave., Cleveland 15 • 443 S. San Pedro St., Los Angeles 13
18 Dickens Ave., Toronto 8

ARMY E NAVY

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

DISTRIBUTION

Proposes Elimination Of Subsidies on Beef

IN Secretary of Agriculture Anderson's proposal to eliminate beef subsidies, some observers see the first step toward terminating the whole wartime food subsidy program, now costing the government nearly $2,000,000,000 a year. The proposal has been placed before livestock producers, and the American National Livestock Association is polling its members on the plan.

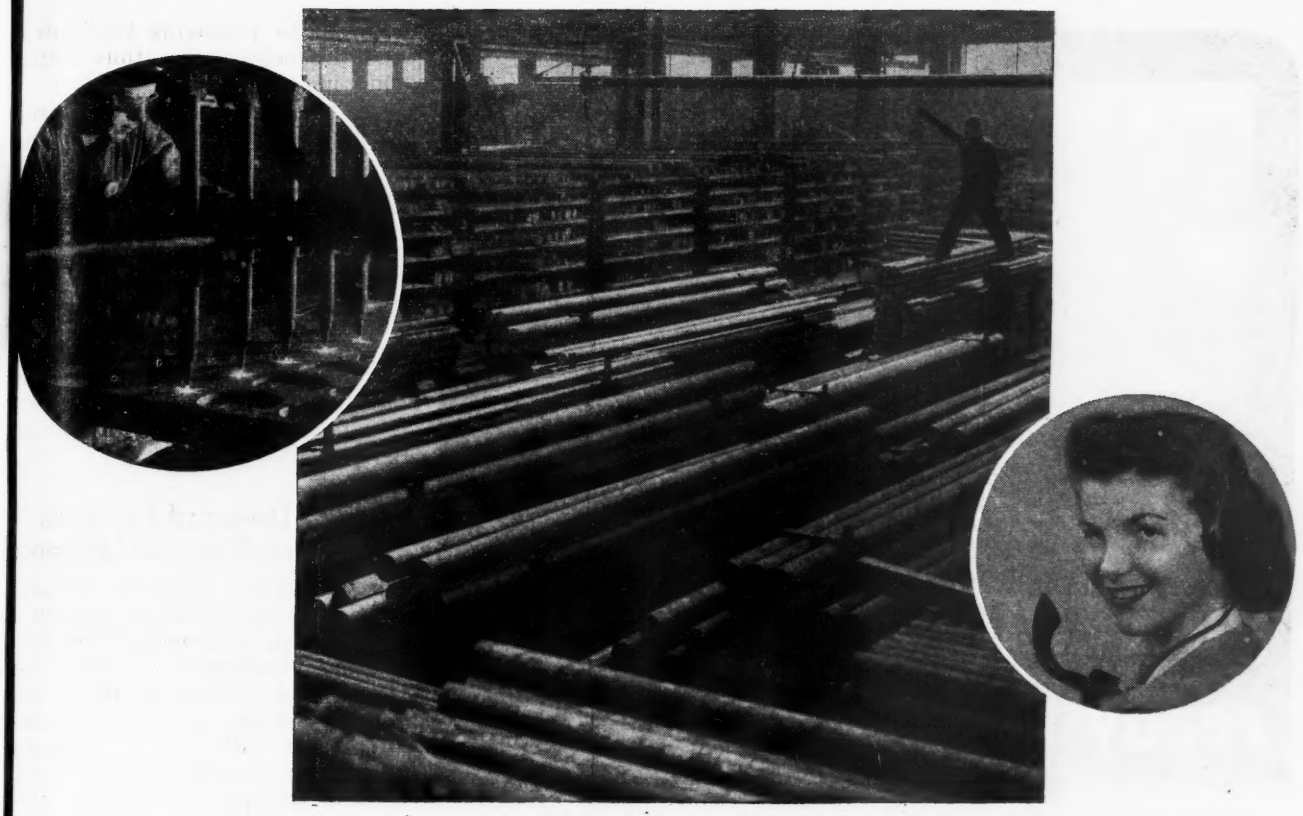
The Secretary believes that government subsidies should be terminated during a favorable price period instead of at a time when there is a postwar drag on prices. He would have preferred termination before V-J Day, had that been possible. He concedes that some cattlemen do not like the plan, but he says that unless the livestock industry gets rid of subsidies before a price recession sets in, it may face a serious problem.

Predict Rapid Rise In Frozen Poultry

WHILE developments in the peacetime distribution of packaged frozen meats may be slowed somewhat by union opposition and construction of refrigeration equipment, there is little doubt that frozen, eviscerated poultry is due for a rapid upswing. Statistics show that movement of live chickens was falling off even before the war.

Reports from the Midwest tell of plants that kill, draw, cut up, package and place the poultry in the freezer within 30 minutes, while the Department of Agriculture reveals a few plants in the Delaware-Maryland-Virginia areas where similar equipment is being installed. Department officials predict that within two years most of the poultry moving out of this area will be frozen rather than live. These same officials are enthusiastic about the future of the frozen poultry industry. They note the producers' efforts to increase efficiency and reduce costs. These efforts go clear back to the breeding of the chickens to produce broader breasts, more white meat and more meat generally, on smaller frames.

The industry hopes to retain the present high consumption of poultry per capita by not only improving the quality of the meat, but by taking full advantage of the 30 percent saving in weight that is



4 Things to Know About Steel

1. Where to Find Largest Stocks—The thousands of kinds, shapes and sizes of steel in eleven Ryerson Steel-Service plants are still the largest, most complete stocks available anywhere. This means that, despite shortages in some sizes, you can be more certain of getting the steel you need from Ryerson.

2. Technical Service—For more than 100 years Ryerson has supplied steel for the food industry. During that period, Ryerson technical men have gained much practical experience about the best type of steel for each food industry application. This service is available to you on any problem of selection or fabrication.

3. Fast, Accurate Preparation—Ryerson saves you time and expense—prepares steel to your exact specifications with modern, precision equipment. Facilities include high-speed hack saws and shears, batteries of flame cutters, punches—everything needed to cut steel to the size and shape you need in the shortest possible time.

4. Prompt Delivery—Whether you need a single piece of steel or many tons you'll get prompt action from the nearest Ryerson plant. Phone, wire, or write for any steel requirement. And if you do not have a copy of our latest Stock List and Steel Data Book, we'll be pleased to send one.

RYERSON SERVICE TO THE FOOD INDUSTRY INCLUDES:

Steel Bars, Mild Steel, Alloy, Stainless—Rounds, Squares, Flats—Hot Rolled and Cold Finished—Shafting, etc.

Plates and Sheets—all kinds including plain, galvanized, corrugated for roofing, siding, etc.

Inland 4-way floor plate and stair treads for safety, rigidity and long life.

Allegheny Stainless Plates, Sheets, Bars, Tubing, etc., for various food processes.

Stainless Steel Castings and pipe fittings for heat and corrosion resistance.

Mechanical Tubing—Seamless Steel, low carbon—also Boiler Tubes and Fittings.

Alloy Steels, Tool Steels.

Structural Steel including I-Beams, Angles, Channels, Tees, Zees.

Hi-Bond Concrete Reinforcing Bars, Wire Mesh and allied building materials.

Bolts, Nuts, Washers, Rivets, etc.

Welding Rod, Babbitt, Solder.

Metal Working Machinery and Tools.

JOSEPH T. RYERSON & SON, INC., Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

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A corner of our busy laboratory

Specialists in PULVERIZING PROBLEMS ready to serve you . . .

Time, money, trouble and annoyance can be saved by taking any problem to *specialists* on that subject. And, this truism was never more applicable than to this subject of dustless pulverizing and our part in it.

For here, competent, experienced research engineers study every phase of each individual problem. Here, the scientific data gathered in our laboratory is carefully correlated with practical tests run with your material on production MIKROS in our Test Grinding Department.

Here, are all the necessary data and latest equipment, for the conducting of expertly planned scientific and production tests, the results of which enable practical recommendations to be made that quickly give you the right answer, backed by a rigid performance guarantee. Consideration by us of your pulverizing problems in their early stages, can mean improved output, lowered production costs and other advantages to you.

Our research laboratory, test grinding facilities and service are available without cost or obligation. Submitting to us a production test sample of 5 to 50 lbs. of your material and full details, is a natural first step toward the answer you seek.

By Invitation Member

WARRANT of QUALITY

WRITE FOR YOUR COPY. Valuable data and information on latest pulverizing methods. Ask for MIKRO-PULVERIZER book and MIKRO-ATOMIZER bulletin.

PULVERIZING MACHINERY COMPANY

97 CHATHAM ROAD • SUMMIT, N. J.

NOW . . . 2 TYPES TO MEET MOST PROCESS JOBS

MIKRO-PULVERIZER (FINE)
MIKRO-ATOMIZER (ULTRA FINE)

Reg. U. S. Pat. Off.

afforded by preparing the birds i the producing area, thus cuttin shipping costs.

As in the case of all other meat of course, wide expansion of th frozen poultry industry depend heavily on the improvement in re frigeration, both in retail outlet and for domestic storage. Manu facturers of freezing equipment a have an eye on this market. Thi is borne out by the recent an nouncement of Deepfreeze Divisio of Motor Products Corp., that the are preparing to invest approxi mately $1,800,000 for buildings an equipment alone.

Heavy Demand Forecast For Postwar Livestock

THE nation's livestock industry faces a bright postwar prospect i the opinion of Department of Agri culture economists. They have given Secretary Anderson a report on adjustments in livestock produc tion that calls for much higher goals than prevailed before the war.

With prosperous economic condi tions, pork output can be increased 32 percent above the 1937-41 av erage, says the report, and beef production can be maintained at the present high level. The report further calls for the rebuilding of sheep flocks to the 1941 level, while milk production might soar to 148,- 000,000,000 lb., as compared with the present annual output of 122,- 000,000,000 lb. The economists also predict continued heavy postwar demand for eggs and poultry.

New Refrigerator Car Now Being Built by IC

PLANS for the immediate construc tion of an ultra-modern, dual-pur pose refrigerator car have been ap proved by the Illinois Central System, based upon recommenda tions of the refrigerator car com mittee of the United Fresh Fruit and Vegetable Association.

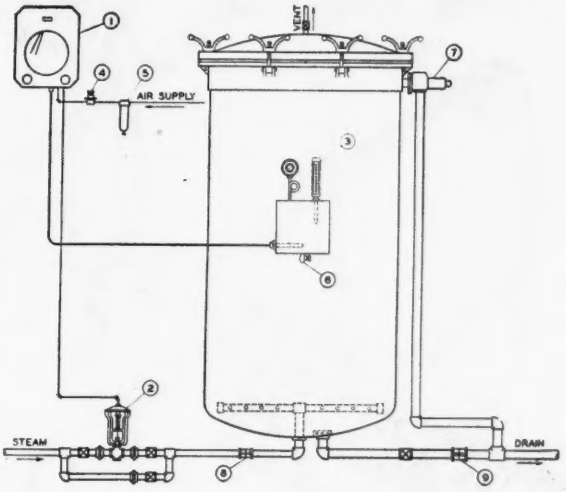
The car is expected to be ready for testing early in October. It will be built of aluminum with fiber glass insulation. Built-in fans and air ducts will insure effective cool ing circulation from the floor through the ice boxes to the ceiling. Collapsible ice boxes will fold back as reinforcements for the ends of the car when the car is trans formed, in a few minutes, from a refrigerator to a box car. When refrigerated, the new car will main tain temperatures low enough to haul not only the usual perishables, but also frozen foods.

(NO. 4 OF A SERIES ON RETORT PRACTICES)

A Good System - '39 Style

Operator must:

1 load retort
2 close cover
3 turn on steam
4 vent retort
5 time cook
6 turn off steam
7 blow down retort
8 open cover
9 unload retort



A *good* operator can produce a consistently *good* product with the Taylor No. 4 Retort Control System ('39 style)... IF he is alert through the "canning" day, IF he doesn't have to watch too many retorts and IF he is diligent through the entire season! But sometimes we wonder if *ANY* operator can be THAT good!

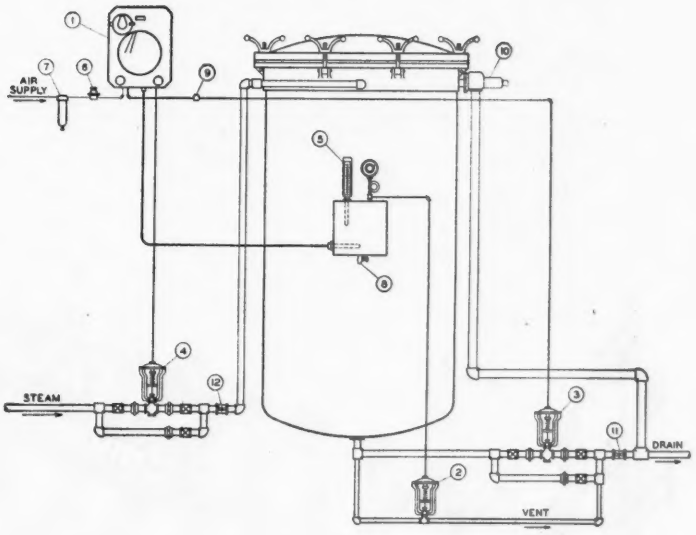
A Better System - '45 Style

All operator has to do is:

1 load retort
2 close cover
3 set timer
4 open cover
5 unload retort

Process timer:

1 turns on steam
2 times cook
3 shuts off steam
4 blows down retort
5 signals operator



The automatic vent valve "2" *completely vents every load.* The Taylor Fulscope Controller with Process Timing Attachment turns steam on and off, blows retort down, *accurately times every cook,* and signals operator when it's time to unload.

Moral:

Keep in touch with Taylor for the newest process control systems for canning plants. Taylor engineers have devoted time and energy to find out how to do your processing jobs best. Take advantage of this experience and you'll know why Taylor Instruments are designed for your job!

ARMY NAVY

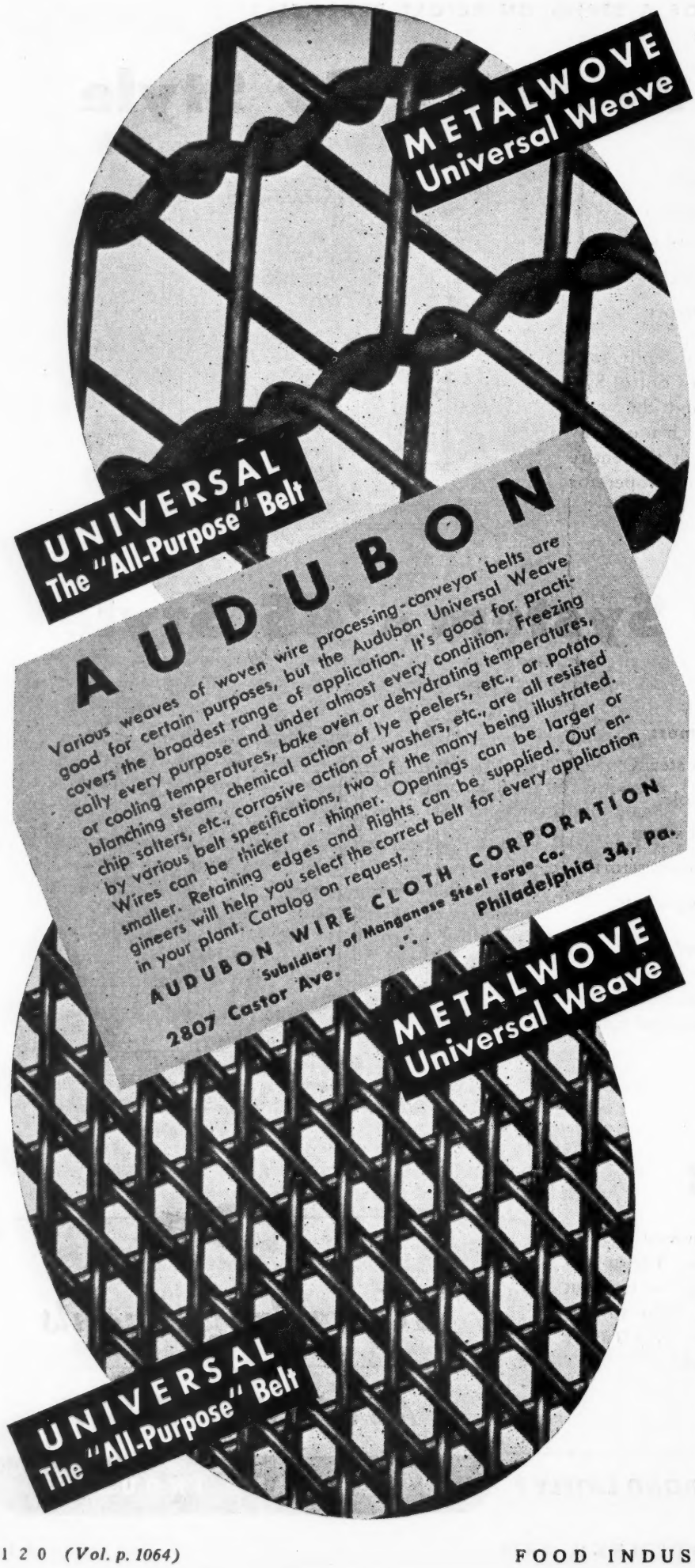
Taylor Instruments

MEAN

ACCURACY FIRST

IN HOME AND INDUSTRY

HAVE YOU BOUGHT A WAR BOND LATELY?


METALWOVE
Universal Weave
UNIVERSAL
The "All-Purpose" Belt
AUDUBON
Various weaves of woven wire processing-conveyor belts are good for certain purposes, but the Audubon Universal Weave covers the broadest range of application. It's good for practically every purpose and under almost every condition. Freezing or cooling temperatures, bake oven or dehydrating temperatures, blanching steam, chemical action of lye peelers, etc., or potato chip salters, etc., corrosive action of washers, etc., are all resisted by various belt specifications, two of the many being illustrated. Wires can be thicker or thinner. Openings can be larger or smaller. Retaining edges and flights can be supplied. Our engineers will help you select the correct belt for every application in your plant. Catalog on request.
AUDUBON WIRE CLOTH CORPORATION
Subsidiary of Manganese Steel Forge Co.
2807 Castor Ave. Philadelphia 34, Pa.
METALWOVE
Universal Weave
UNIVERSAL
The "All-Purpose" Belt

CLOSE THAT DOOR

A bell and a light caution employees i this San Francisco packing plant that th door to the refrigerated room is open an is about to close by photoelectric contro When a worker pulls the cord to open th door, the photoelectric beam is establishe As he crosses the threshold, the beam broken. When the beam is reestablishe the bell and light go to work, continuin until a cord on the inside is pulled to clos the door. If after a lapse of seven second however, the cord is not pulled the contr automatically closes the door, thus avoi ing refrigeration loss.

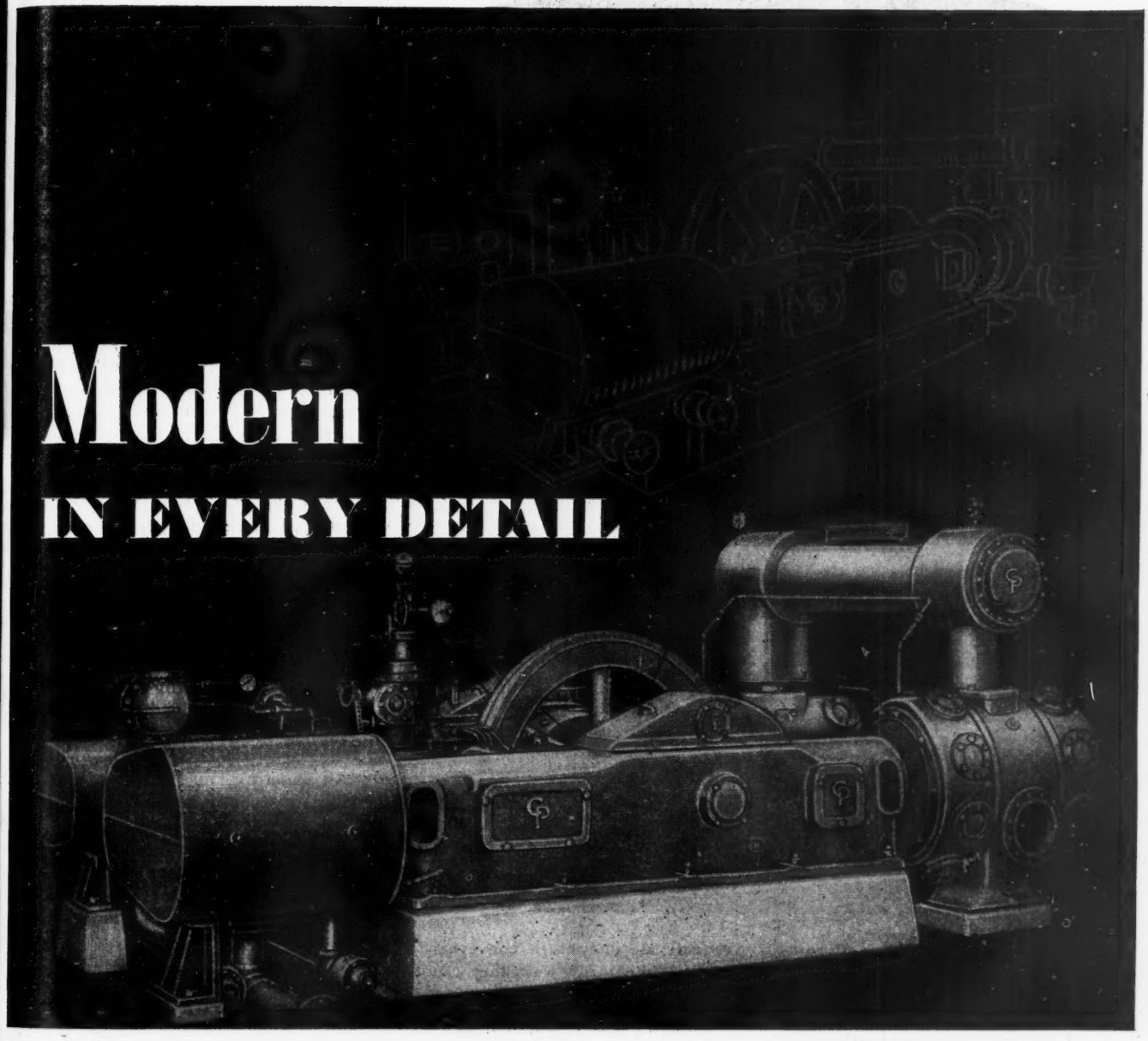
Ease Pickle Set-aside For Army Procuremen

ALL packers of cucumber pickle and pickle products who have com pleted their requirements unde War Food Order 101 were exempte from the provisions of the orde effective August 7, 1945, unde Amendment 5, the Department o Agriculture has announced.

Those packers who have not con tracted for sale to, or have not de livered to, Army procurement offi cers a quantity of pickle product equal at least to 40 percent of th total amount of cucumber pickle and pickle products owned by the on August 17, 1944, or acquired b them subsequent to that date an prior to May 1, 1945, are still re quired to complete their total obli gations under the amendment t the order, even though such fulfil ment may mean drawing from thei 1945 pack.

More Edible Oil

SINCE the agreement of May 9 be tween the United States and Ar gentina for the procurement of Ar gentine vegetable oilseeds, oil an linseed cake, the U. S. Commerci Co. has purchased 180,000 tons o these critically short commoditie through July, for use in the Unite States and liberated Europe, th



CLASS H STEAM DRIVEN COMPRESSOR

FORTY years of experience went into the building of CP Class H — latest model of CP Steam Driven compressors.

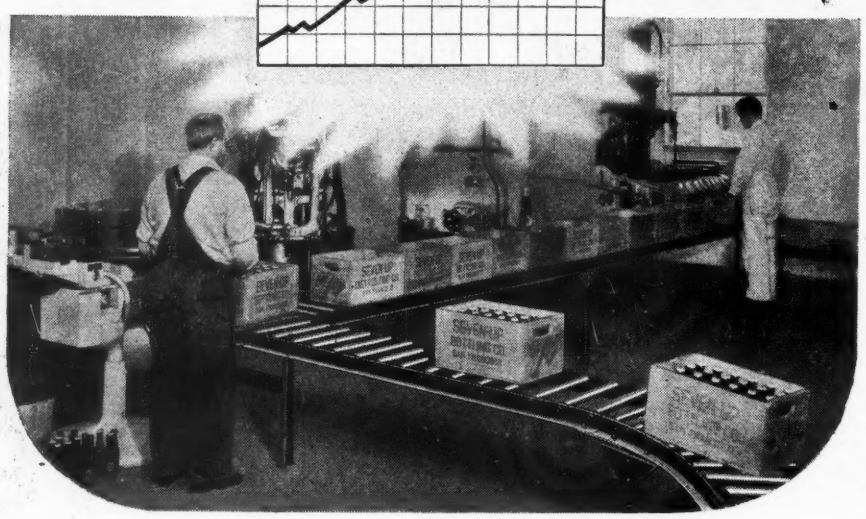
A thoroughly modern steam end, proportioned to the purchaser's steam conditions, combined with full force-feed lubrication of the running gear and a highly efficient air end with its Simplate Valves, all contribute to the high overall economy of these CP machines. The double crosshead-tie rod construction provides direct, straight-line transmission of power from steam end to air end. Capacities range from 400 to 6600 c.f.m., 100 to 125 pounds air pressure. Other sizes in single and multi-stage design for lower and higher pressures. Write for literature.

★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

AN ORDERLY CONVEYOR-COORDINATED PLANT BESPEAKS AN EFFICIENT PLANT!



PRODUCTION processes coordinated and synchronized with conveyors assure a clean, orderly, efficient plant.

Conveyors break the bottle-necks that cause confusion, congestion, loss of productive man-hours, reduced output. They channel the flow of material and products in process—work flows smoothly without halt or interruption and with the least manual hauling.

Make the most of your productive time—manpower—space—investigate all the things conveyors can do—the many ways they can earn money for you.

Standard builds roller, belt, chain, slat, push-bar, power and gravity conveyors, spiral chutes, portable pilers, pneumatic tube systems. Standard Conveyor Company is equipped by experience and facilities to make yours a conveyor coordinated plant. Write for valuable reference book "Conveyors by Standard," Catalog No. FI-95

STANDARD CONVEYOR CO.
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities

Foreign Economic Administration has announced.

The company, an agency of FEA, undertook the negotiation of this agreement and the procurement of these commodities with the concurrence of the Department of State and Department of Agriculture.

OPA Sets Prices for Airshipped Produce

IN establishing ceiling prices for fresh fruits and vegetables shipped by air, OPA has not taken the low-cost claims of other agencies too seriously. The prices are to be obtained by adding to the f.o.b. country shipping point ceiling price, the actual cost of the air transportation, or the amount that transportation would have cost at 42 cents per ton mile, whichever is lower. There has been some discussion, recently, of such shipments being made at from 5 to 10 cents per ton mile.

Shipments of these commodities must be made in units or packages that can be sold to the customer without repackaging by the retailer. Each package must be marked to show its minimum net weight and the fact that it was shipped by air. All labeling, marking and packaging must be done before shipment. An allowance is made for this purpose.

The pricing is on an experimental basis, according to OPA, and may be used through September 30.

No Imports of Pepper During 1943 and 1944

THE continued lack of pepper is explained with the recent announcement by the Bureau of Census that there were no imports of unground pepper in 1944. Virtually all pepper imports before that came from areas later held by the Japanese.

Unground pepper imports declined from 73,957,710 lb. in 1941 to 6,696,821 lb. in 1942, and were negligible in 1943.

Almost the entire stock of unground pepper entering the United States during 1941 and 1942 came from the Netherlands Indies and British Malaya, which supplied 88 percent and 10 percent, respectively, of our pepper during those two years. None came from either country in 1943 or 1944.

Canned Milk

COMMODITY CREDIT CORP. has informed the evaporated milk industry that hereafter all milk offered for sale to CCC is preferred packed

It pays to be a Bemis Multiwall Paper Shipping Sack Customer!

For years, manufacturers have said, "It pays to be a Bemis Multiwall Paper Shipping Sack Customer." Wartime conditions have brought this fact home in hundreds of instances. • Perhaps the most important reason is that Bemis has made an unusual record in fulfilling shipping promises and in maintaining quality under wartime conditions.

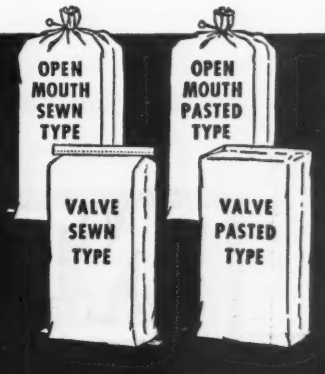
Bemis Multiwall Paper Shipping Sacks

6 PLANTS

Peoria, Ill. · East Pepperell, Mass. · Mobile, Ala. · San Francisco, Calif. · Wilmington, Calif. · St. Helens, Ore.

BEMIS BRO. BAG CO.

OFFICES: Baltimore · Boston · Brooklyn · Buffalo · Charlotte · Chicago · Denver · Detroit · East Pepperell · Houston · Indianapolis · Kansas City · Los Angeles · Louisville · Memphis · Minneapolis · Mobile · New Orleans · New York City · Norfolk · Oklahoma City · Omaha · Orlando · Peoria · St. Helens, Ore. · St. Louis · Salina · Salt Lake City · San Francisco · Seattle · Wichita · Wilmington, Calif.



"ENTOLETER" PROTECTS QUALITY STANDARDS

PROTECT
YOUR PRODUCTS
WITH
THIS MODERN
INSECT
CONTROL

While all good housekeeping practices are important, the final *essential* safeguard is to make certain that no insect life is present in raw materials, in blending stocks and in the finished product before packaging. This calls for *continuous* control, applied as part of the processing operation.

That is why many food processors are extending "ENTOLETER" Continuous Insect Control throughout their plants. The remarkable benefits obtained through the operation of one or two "ENTOLETERS" in a mill are the most compelling reason for extending this protection to treat all free-flowing dry materials that may be endangered by infestation. Write today for bulletin, describing "ENTOLETER" applications. Entoleter Division, The Safety Car Heating and Lighting Company, Inc., P.O. Box 904, New Haven, Connecticut.

ENTOLETER
INFESTATION DESTROYER
REG. U. S. PAT. OFF.

CONTINUOUS DESTRUCTION OF ALL INSECT LIFE

in the regular domestic can, bearing the seller's own commercial label, and packaged in either the V3c or V3s case.

Consideration will be given, however, to offers of milk packed in stronger cans and cases if such packaging is for the purpose of clearing inventories.

Uniform Flour Packs Established by 33 States

A UNIFORM requirement that flour be sold in packages of 100, 50, 25, 10 and 5 lb. became a law in the following 30 states in 1945:

Alabama, California, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Nevada, New Hampshire, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Utah, Washington, West Virginia, and Wisconsin. Kentucky, Nebraska and Texas passed the law last year, making a total of thirty-three, enacting uniform legislation.

When the program for uniform package legislation, organized and directed by Millers National Federation, was first initiated, 15 states had laws unfavorable to the decimal schedule. Twelve of the 15 laws have been repealed since, while the three remaining states, Louisiana, Mississippi and Virginia, are not holding legislative sessions until 1946.

Cash Corn

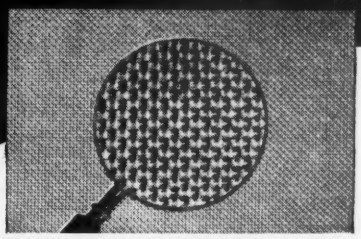
CORN PRODUCTS REFINING CO. inserted a full-page advertisement in a number of Midwest dailies, during August, asking farmers to release some of the holdover corn being retained on the farms against possible shortages in the current crop.

The ad explains that even though there is no actual shortage of corn, the elevators are empty, two refining plants have had to shut down, and others may soon be forced to follow, because cash corn was not being made available. With this year's corn crop estimated at better than average, the ad asks that as much corn as can be spared be consigned to the company, through regular channels.

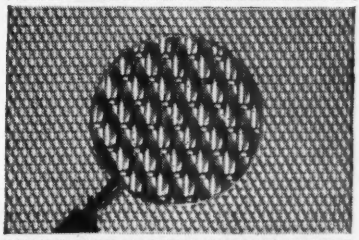
California Wine

CALIFORNIA WINE INSTITUTE preliminary estimates indicate that California will supply approximately 85 percent of the wine consumed in the United States for 1945. Other states will furnish about 10 percent, and imported foreign wine will not account for more than 5 percent of this year's total.

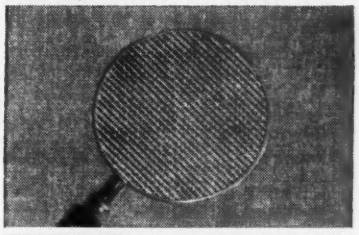
In weaves and meshes for EVERY FILTERING and SCREENING NEED



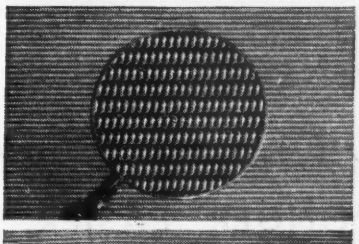
PLAIN WEAVE *wire cloth. Woven with from 1 to 250 mesh per lineal inch. The cloth shown is 40 mesh, .010" dia. wire. (Mag. 6x)*



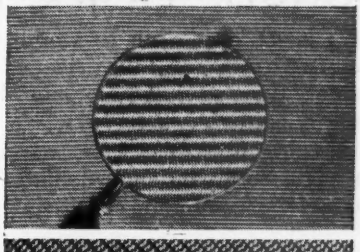
OBLONG MESH *wire screen. Woven with openings ranging from 1" to .007". The screen shown is 30x16 mesh, .015" x .0165" dia. wire. (Mag. 6x)*



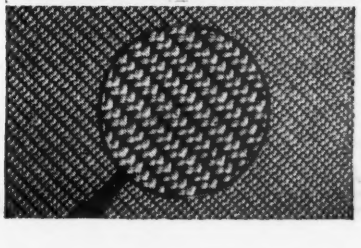
TWILLED WEAVE *wire cloth. Woven with from 20 to 400 mesh per lineal inch. The cloth illustrated is 200 mesh, .0023" dia. wire. (Mag. 6x)*



PLAIN DUTCH WEAVE *(Corduroy) filter cloth. This weave is produced in a variety of meshes from 10 x 52 to 20 x 150. The cloth shown is 24x110 mesh. (Mag. 6x)*



TWILLED DUTCH WEAVE *filter cloth. Woven in standard meshes as fine as 28 x 500; special meshes up to 50x750. The cloth shown is 28 x 500 mesh. (Mag. 6x)*



STRANDED OR BRAIDED WEAVE *filter cloth is also produced in both Monel and nickel. The cloth illustrated is 36 mesh. (Mag. 6x)*

Think of the features *you* want in wire screens and filter cloth.

Chances are, you'll find them in nickel . . . or in a nickel alloy.

To all industry, wire screens and filter cloth of Monel, nickel and Inconel bring this unusual combination of properties:

1. **High strength, plus rigidity and toughness.**
2. **Exceptional resistance to corrosion . . . and absolute freedom from rust.**
3. **Excellent resistance to wear, erosion and abrasion.**
4. **Resistance to elevated temperatures, and to low temperature embrittlement.**
5. **Ease of forming.**
6. **Ease of joining by soldering, brazing or welding.**

Monel, nickel and Inconel wire screen and filter cloth are available in every standard weave and mesh . . . and in a variety of special weaves for specific needs. Selection of the most economical and best suited corrosion resisting screen or cloth for a given purpose is thus assured.

Consult your regular source of supply, or write us for further information on the suitability of nickel and its alloys for your filtering and screening problems.

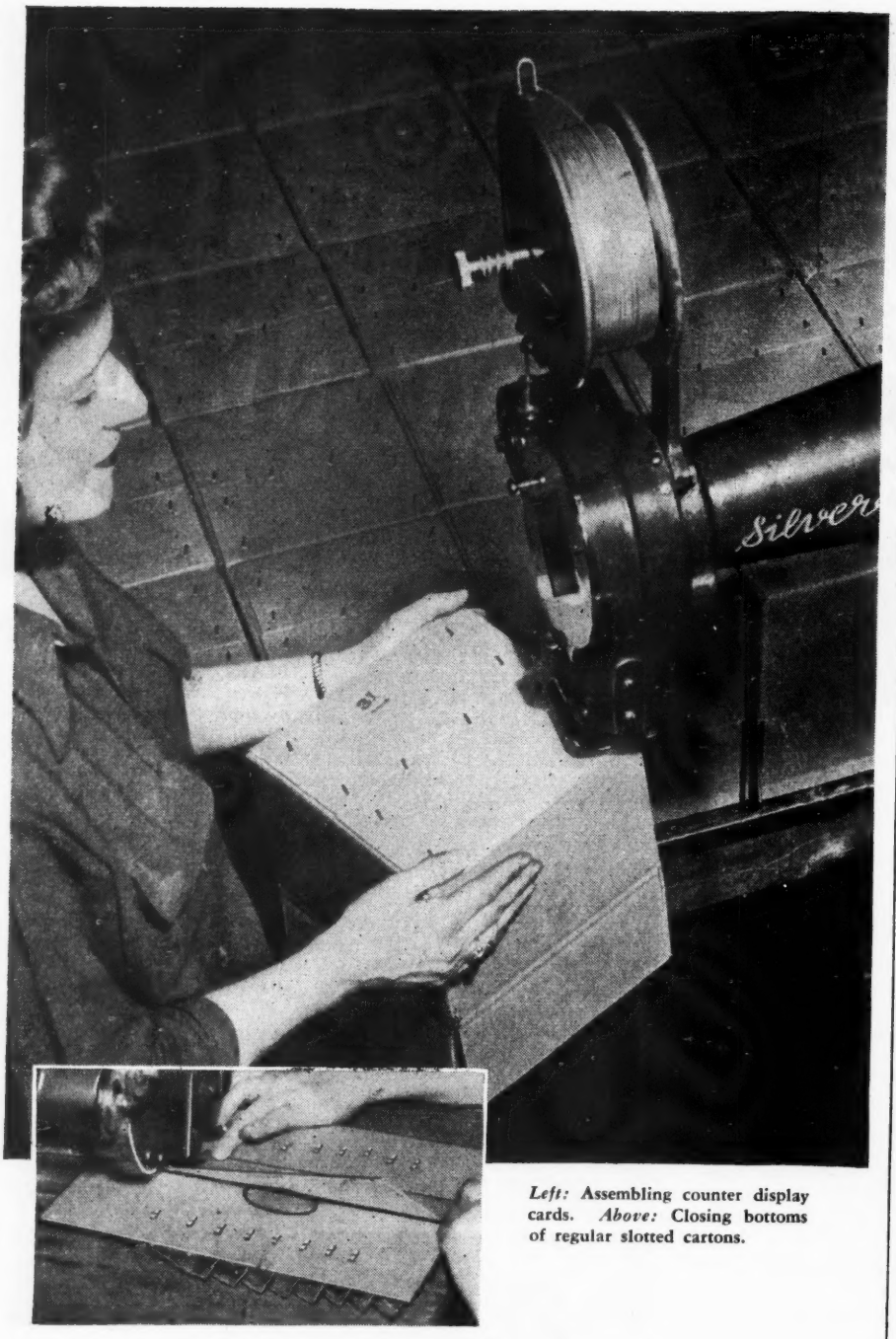
THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

NICKEL INCO TRADE MARK ALLOYS

MONEL* • "K" MONEL* • "S" MONEL* • "R" MONEL* "KR" MONEL* • INCONEL* • "Z" NICKEL* • NICKEL

Sheet . . . Strip . . . Rod . . . Tubing . . . Wire . . . Castings . . . Welding Rods (Gas and Electric)

**Reg. U. S. Pat. Off.*



Left: Assembling counter display cards. *Above:* Closing bottoms of regular slotted cartons.

Stitch with Steel

FASTER, STRONGER, EASIER, NEATER

Stapling counter cards . . . tacking cloth to wood . . . stitching seams of leather gloves . . . these are only a few of many Acme Silverstitcher jobs which are done as easily, economically and speedily as stitching all types of boxboard containers.

Silverstitching is "stitching with steel" . . . automatic forming and driving of steel stitches from continuous-length coils of Acme Silverstitch stapling wire . . . combining positive fastening with attractive appearance.

For facts on the economies which Silverstitching can bring to your specific closure, tacking and fastening operations, write us.

SilverStitch SilverStitchers

2845 ARCHER AVENUE ACME STEEL COMPANY CHICAGO 8, ILLINOIS

ALSO MANUFACTURERS OF ACME STEELSTRAP AND STRAP APPLYING EQUIPMENT

PROCESSING

Cornell Establishes Course in Food Tech

THE New York State College of Agriculture at Cornell University will offer a 4-year course in food processing, leading to a degree of Bachelor of Science, starting with the fall semester in November. The course requires 120 hours of course work and the equivalent of at least one year of farm work or a combination of work on a farm and in a food processing plant.

The course is the outgrowth of a study made by the educational committee of the New York State Canners Association and a special committee of the college. The canners' committee reported its agreement that "an industry the size of ours is in rather a sorry plight when it has to train its own men or acquire them from someone else who has already trained them."

The following curriculum has been arranged:

First Year: Military science, orientation, English, general botany, inorganic chemistry, mechanical drawing and mathematics.

Second Year: Military science, qualitative and quantitative chemistry, bacteriology, mathematics, agronomy, agricultural engineering and vegetable crops.

Third Year: Agricultural economics, physics, general economics, organic chemistry, food processing, oral and written expression, social studies and pomology.

Fourth Year: Entomology, food engineering, and plant pathology.

Electives include: (1). Courses in food processing. (2). Courses in business aspects of the processing industry. (3). Courses in production and handling of crops for processing.

New Cure Reduces Sweet Potato Loss

PART of the sweet potato loss during storage may be avoided, says Dr. J. S. Cooley of the Plant Industry Station, Department of Agriculture, by harvesting and handling them so that fewer will rot, and by deciding, immediately on digging, what part of the crop is least likely to store well, marketing that part for early consumption.

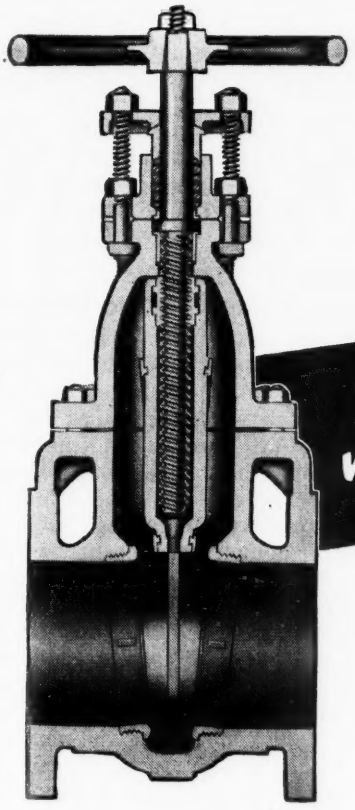
After deciding what potatoes not to try to cure—those with black rot, those injured in handling or chilled, those that have been in cold, wet ground before harvest, or those kept cool for some time after digging—start immediately the curing of the promising sweet potatoes by

For All Piping Equipment Needs . . .

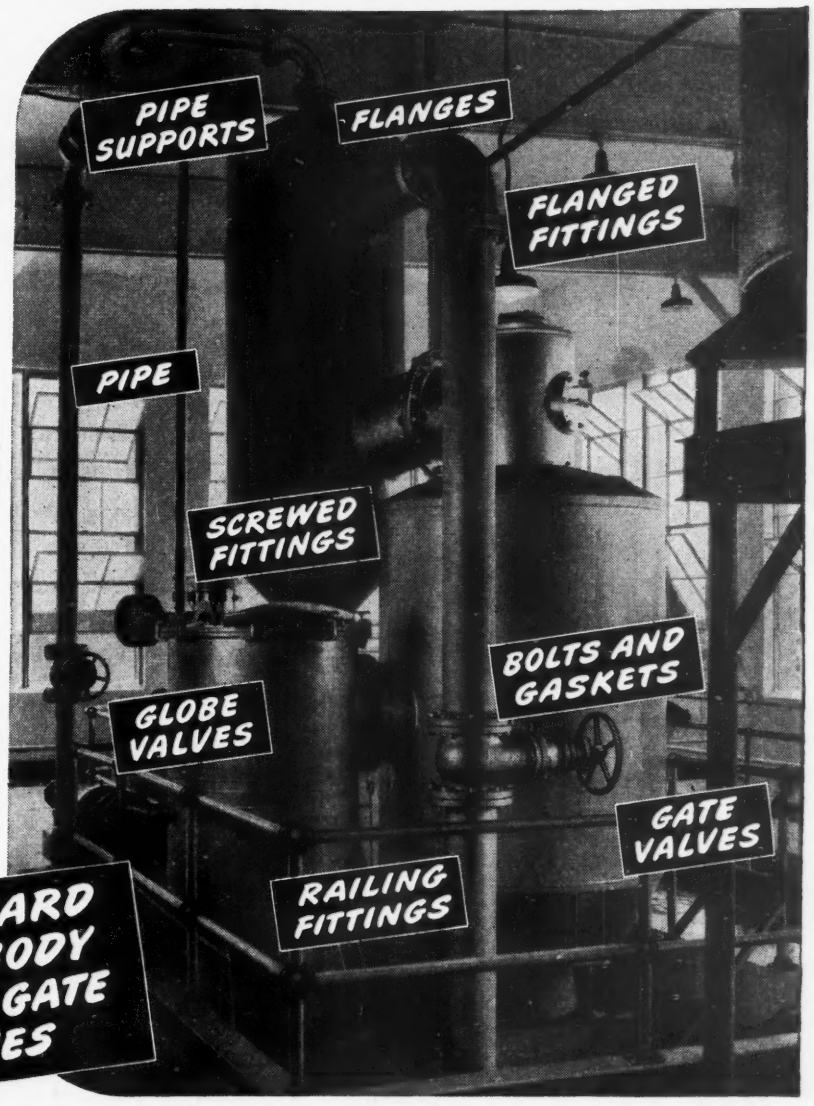
SEND CRANE YOUR ORDER

ONE SOURCE OF SUPPLY
ONE RESPONSIBILITY
ONE STANDARD OF QUALITY

One order to your Crane Branch or Wholesaler covers all requirements. This single source offers the world's greatest selection of piping materials —in brass, iron and steel. By standardizing on Crane, you are sure of uniform quality throughout piping systems—with one responsibility behind them. There's no better way of helping to assure the best installation. What's more, by using Crane *complete* piping materials service, you simplify your task of catching up on deferred replacements . . . and keeping piping at peak efficiency. As an example of the complete Crane line, read the service recommendations below for Standard Iron Body Gate Valves.



Cold water and vacuum lines above milk evaporator.



SERVICE RECOMMENDATIONS: **Crane Standard Iron Body Wedge Gate Valves** are widely used in dairy and food packing plants. With Brass trim, they are recommended for steam, water or oil lines; all-iron valves for oil, gas or fluids that corrode brass but not iron. Made in O.S. & Y. and Non-Rising Stem patterns.

Working Pressures

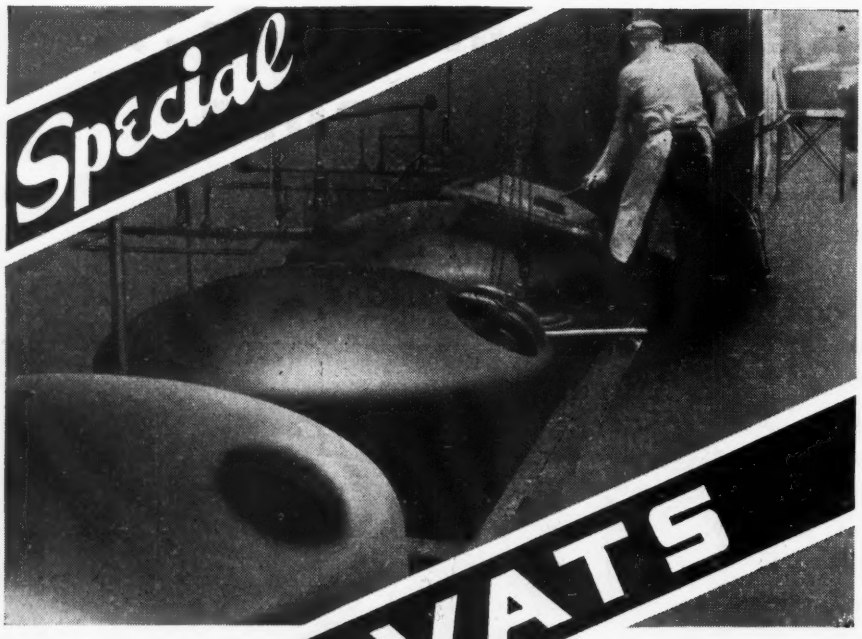
Size of Valve	Screwed or Flanged End Valves		Hub End Valves
	Saturated Steam	Cold Water, Oil or Gas, Non-Shock	Cold Water or Gas Non-Shock
2 to 12 in.	125 pounds	200 pounds	200 pounds
14 and 16 in.	125 pounds	150 pounds	150 pounds
18 to 24 in.	*	150 pounds	150 pounds

*For steam lines larger than 16-in., Crane 150-Pound Cast Steel Gate Valves are recommended. (For sizes under 2-in., use Crane Clamp Gate Valves.)

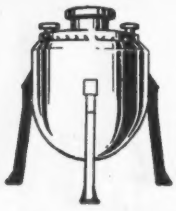
CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. • *Branches and Wholesalers Serving All Industrial Areas*

CRANE

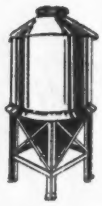
VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS



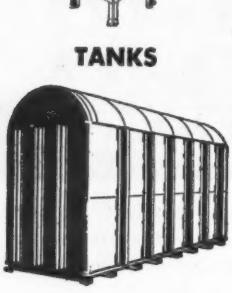
Also---
KETTLES



BINS



TANKS



If you have a problem involving special processing equipment, consult with us. Others in the Food Industry have found our long and varied experience in metal fabrication a completely satisfactory answer to their requirements for special storage and processing equipment.

Photo above shows a battery of Stacey Brothers special high pressure rendering vats of all-welded construction. We regularly produce such equipment in aluminum, steel, stainless steel, and other alloys.

Stacey Brothers produce work to A.S.M.E. standards, from No. 16 gauge sheet metal up to three inches in thickness. Send us your specifications and drawings. We shall be pleased to submit quotations and recommendations.

The STACEY BROS. GAS CONSTRUCTION CO.
ONE OF THE DRESSER INDUSTRIES
5535 Vine Street Cincinnati 16, Ohio

STORAGE and PROCESSING EQUIPMENT

Stacey Brothers ENGINEERS • FABRICATORS ERECTORS • RECOGNIZED EXPERIENCE & FACILITIES

SAMPLING PEANUTS

Even though peanut production has more than doubled in the past two years, the National Peanut Council plans to spend $1,000,000 during the next three years to find new uses for the peanut, to study insect infestation control, and to promote the peanut's role in American life. Here, core samples are being taken before unloading at a Georgia processing plant. The peanuts have been brought from the farm by truck.

giving them the "double 85" treatment. That means giving them a preliminary holding for 10 or 12 days at 85 deg. F. and at 85 percent humidity. Prompt curing brings about changes that make the roots more resistant to storage disorders for as long as six to eight months. The storage temperature following the curing should be 55 to 60 deg. F.

Simplot to Increase Mashed Potato Output

J. R. SIMPLOT, owner and operator of the big potato and onion dehydrating plant at Caldwell, Idaho, has advised that a granular dehydrated potato production line will be installed before the plant opens for the new season's production.

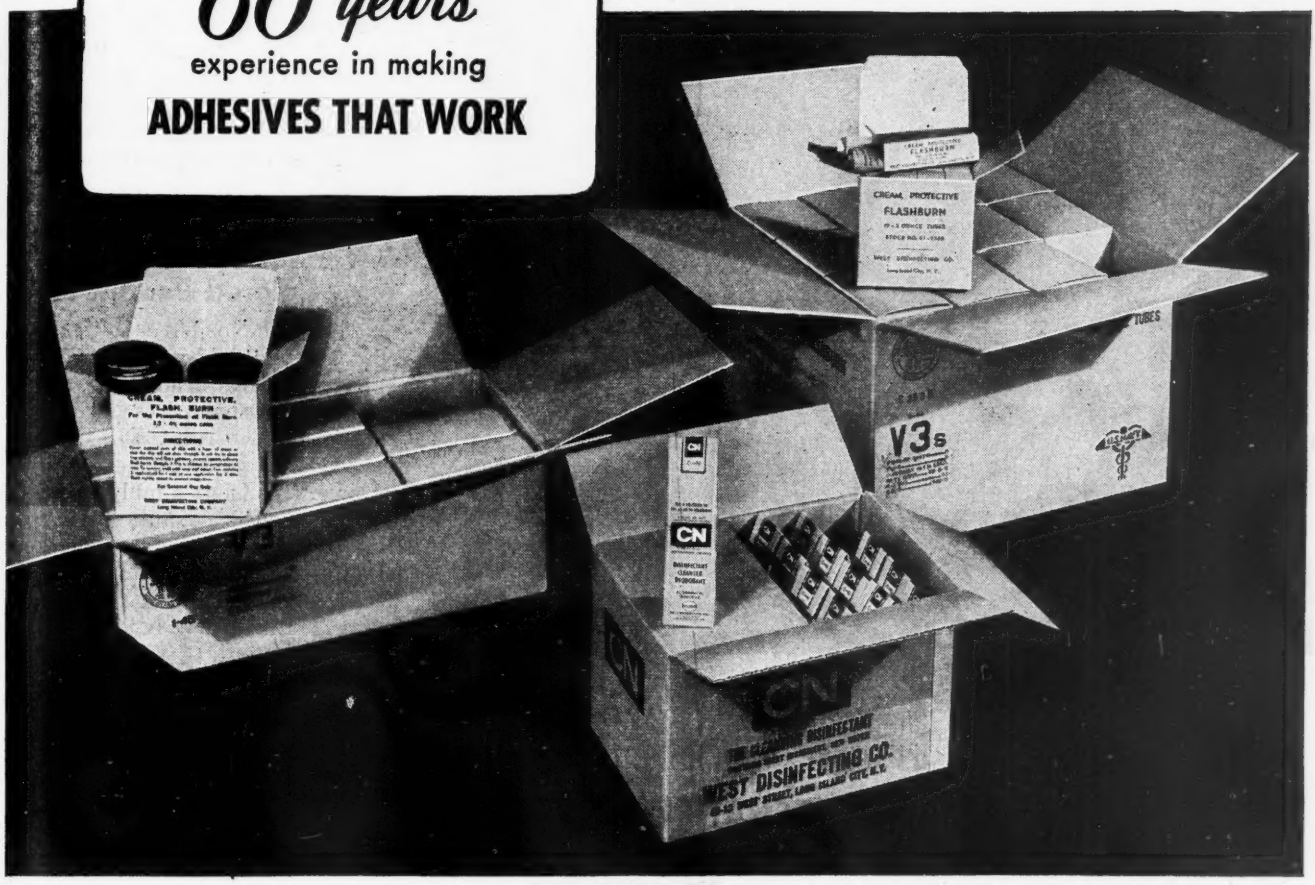
The process will turn out a new type of dehydrated mashed potatoes, and the output will run from 2 to 5,000,000 lb. this year.

Mr. Simplot said the plant processed 25,500,000 lb. of potatoes and 2,000,000 lb. of onions during the last 11 months. This will increase 15 to 20 percent during the next 12 months, it was predicted.

Florida Foods Formed

FINANCING of Florida Foods, Inc., Orlando, Fla., has been completed and the company plans to start production of orange, and probably other citrus juices, reduced by a vacuum process to a liquid concen-

60 years'
experience in making
ADHESIVES THAT WORK



"We wish to commend you for your special adhesive"

An important new war-product, *Protective Flashburn Cream,* helps prevent injuries due to flash burns. This cream, produced by West Disinfecting Company, manufacturers of "CN" and other products for the promotion of sanitation, must be securely safeguarded on its way over-seas.

The West Company writes: "We believe this product is one of the most important items developed during the war. It is packed for over-seas shipment in V-Cases necessitating the use of a water-resistant adhesive, which is a required part of Government specifications to which we must comply. We have found your special adhesive excellent for our purposes and wish to commend you for this excellent product."

Arabol takes pride in this evidence of ability to meet each manufacturer's particular requirements. This indicates why more than 10,000 adhesives formulas are on file in our laboratories—each one representing a determined effort to supply the exact adhesive for a specific requirement. Write for full information on Arabol V-Case and other Case Sealing Adhesives. See the Arabol Representative when he calls—he knows adhesives.

THE ARABOL MANUFACTURING CO.

Executive Offices: **110 East 42nd St., New York 17, N. Y.**

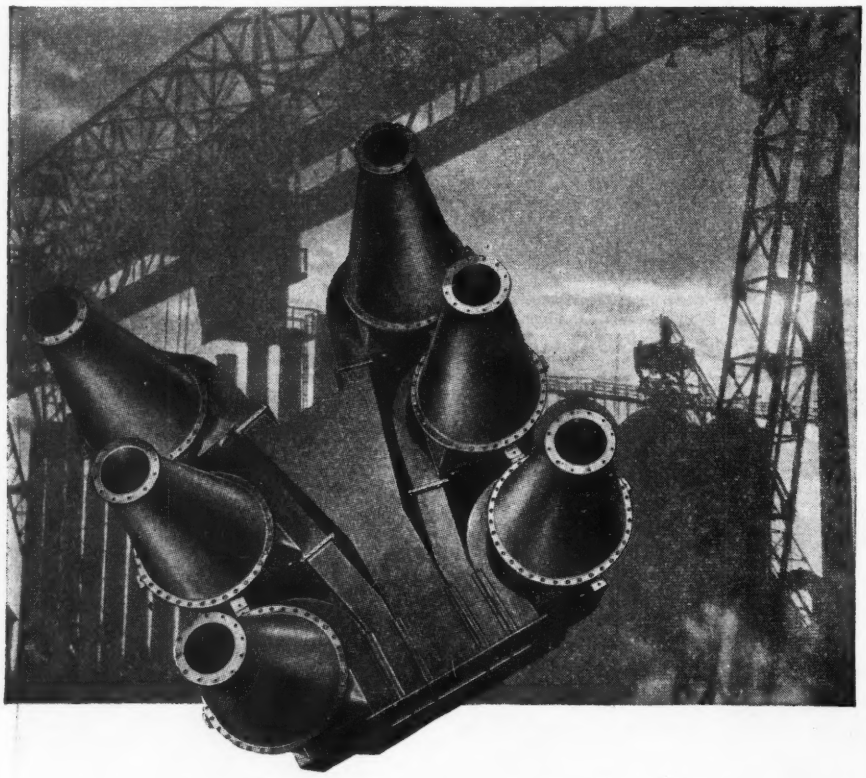
CHICAGO—54th Ave. & 18th Street • SAN FRANCISCO—30 Sterling Street

Branches in Principal Cities • Factories in Brooklyn, Cicero, San Francisco

Adhesives? . . . ARABOL!

SIXTY YEARS OF PIONEERING

SPLIT-DUCT MANIFOLDING



Buell's assurance of
HIGH EFFICIENCY, LOW MAINTENANCE, LONG LIFE

SPLIT-DUCT MANIFOLDING used in Buell (van Tongeren) Multiple Cyclones ensures *uniform* distribution of *both gas* and *dust* to the cyclone collectors. This method is most important to final collection efficiency. Uneven distribution can cause local recirculation of gas, resulting in greater erosion rates in the cyclones receiving the higher concentrations and in the impairment of collection efficiency. With Split-Duct Manifolding, a Buell design feature, maximum collection efficiency is attained by this uniform distribution of the gas load.

The outlet can be installed to discharge the cleaned gases from *any side* or *end*, a flexibility of arrangement that cannot be obtained with *unit chamber manifolding*.

Buell Dust Recovery Systems are designed to do a job, not just to meet a "spec". A promise fulfilled by Buell's high efficiency, long life and low maintenance in hundreds of installations throughout American industry.

BUELL FEATURES

SHAVE-OFF
LARGE DIAMETERS
EXTRA-STURDY CONSTRUCTION
CORRECT HOPPER DESIGN
SPLIT-DUCT MANIFOLDS
INNER WELDS GROUND SMOOTH

RESULT IN

HIGH COLLECTION EFFICIENCY
LESS FAN BLADE WEAR
LOW DRAFT LOSS
LOW POWER CONSUMPTION
HIGH TEMPERATURE RESISTANCE
UNLIMITED CAPACITY
NO MOVING PARTS
FREE DUST FLOW

PRODUCE

HIGH EFFICIENCY
LOW MAINTENANCE
LOW OPERATING COST
LONG LIFE
NO CLOGGING

buell
DUST RECOVERY SYSTEMS

JUST OFF THE PRESS: Buell's new revised book—*"The Buell (van Tongeren) System of Industrial Dust Recovery"*—now in its fourth printing, is just off the press. Write for your copy today.

BUELL ENGINEERING COMPANY, INC.
Suite 5000, 8 Cedar Street, New York 5, N. Y.
Sales Representatives in Principal Cities

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

trate or dry powder form. The company has a license with the National Research Corp., Boston, to use the processes developed by that corporation.

As compensation, Florida Foods agrees to pay National Research 2½ percent of its net sales for 20 years, and thereafter, a 2½ percent royalty on products covered by any unexpired corporation-owned patent.

New Method Overcomes Colored Peanut Meal

A SIMPLE, inexpensive method for removing the dark red color from peanut skins has been found at the Southern Regional Research Laboratory, New Orleans. The process, discovered by R. S. Burnett and his coworkers, consists simply in washing the shelled peanuts in a cold dilute lye solution, rinsing the kernels for the purpose of removing excess lye adhering to them, and drying to the properly determined moisture content.

The development of this decolorizing process removes one of the greatest obstacles to the production of peanut protein for certain industrial purposes.

Army Specifications

THE Quartermaster Corps has issued the following specifications. They are listed with the Chicago Quartermaster Depot number and date of issue.

Packing Frozen, Chilled, Smoked or Salted Fish for Domestic and Overseas Shipment, C. Q. D. No. 366, Mar. 29, 1945; use in Federal Specifications PP-F-381, Fish, Fresh; PP-F-401, Fish, Salted or Smoked. Frozen Telescoped Lamb, C. Q. D. No. 367, Mar. 29, 1945. Packaging and Packing Spices, C. Q. D. No. 178B, Mar. 4, 1945, Amendment 1, Apr. 6, 1945. Chewing Gum, C. Q. D. No. 324, Mar. 16, 1945, Amendment 1, Apr. 12, 1945. Ice Cream, Sherbets and Ices, C. Q. D. No. 134, May 26, 1943, Amendment 1, Apr. 18, 1945. Emergency Parachute Ration, C. Q. D. No. 302A, Jan. 3, 1945, Amendment 1, Apr. 13, 1945. Fresh Pasteurized Milk, C. Q. D. No. 377, Apr. 2, 1945. Whole Dry Milk and Nonfat Solids, C. Q. D. No. 166A, Apr. 8, 1944, Amendment 3, Apr. 17, 1945, Superseding Amendment 2, Feb. 10, 1945. Pork Liver, C. Q. D. No. 125A, Apr. 6, 1945, Superseding C. Q. D. No. 125, Apr. 14, 1943. Canned Meat and Corn, C. Q. D. No. 311A, Mar. 30, 1945, Superseding C. Q. D. No. 311, Aug. 16, 1944. Chocolate and Chocolate Flavored Syrup, C. Q. D. No. 369, Mar. 23, 1945. Canned Ham Chunks, C. Q. D. No. 190A, Mar. 29, 1945, Superseding C. Q. D. No. 190, July 1, 1944. Nonalcoholic Lemon Flavoring, C. Q. D. No. 71B, Apr. 2, 1945, Superseding C. Q. D. No. 71A, Jan. 10, 1943. Frozen Vegetables, C. Q. D. No. 167A, May 6, 1944, Amendment 1, Apr. 12, 1945. Roasted Salted Peanuts, C. Q. D. No. 177A, Sept. 7, 1944, Amendment 2, July 3. 1945, Superseding Amendment 1. Canned Chili Con Carne, C. Q. D. No. 365, Mar. 27, 1945. Amendment 1, July 9, 1945. Packaging and Packing Canned Subsistence Items for Overseas Shipment, C. Q. D. No. 350A, June 23, 1945, Amendment 1, July 16, 1945. Dehydrated Sweet Potatoes, C. Q. D. No. 60F, Feb. 26, 1945, Amendment 1, July 7, 1945, Dehydrated White (or Irish) Potatoes, C. Q. D. No. 59H, Mar. 23, 1945, Amendment 1, July 21, 1945.

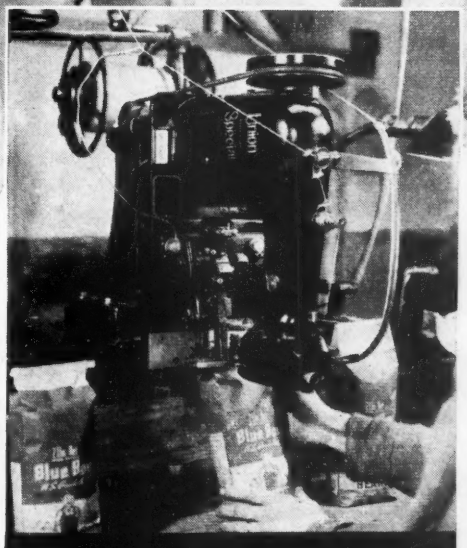
CUTS PACKAGING COSTS!

•

the Union Special DUBL-TAPE CLOSURE

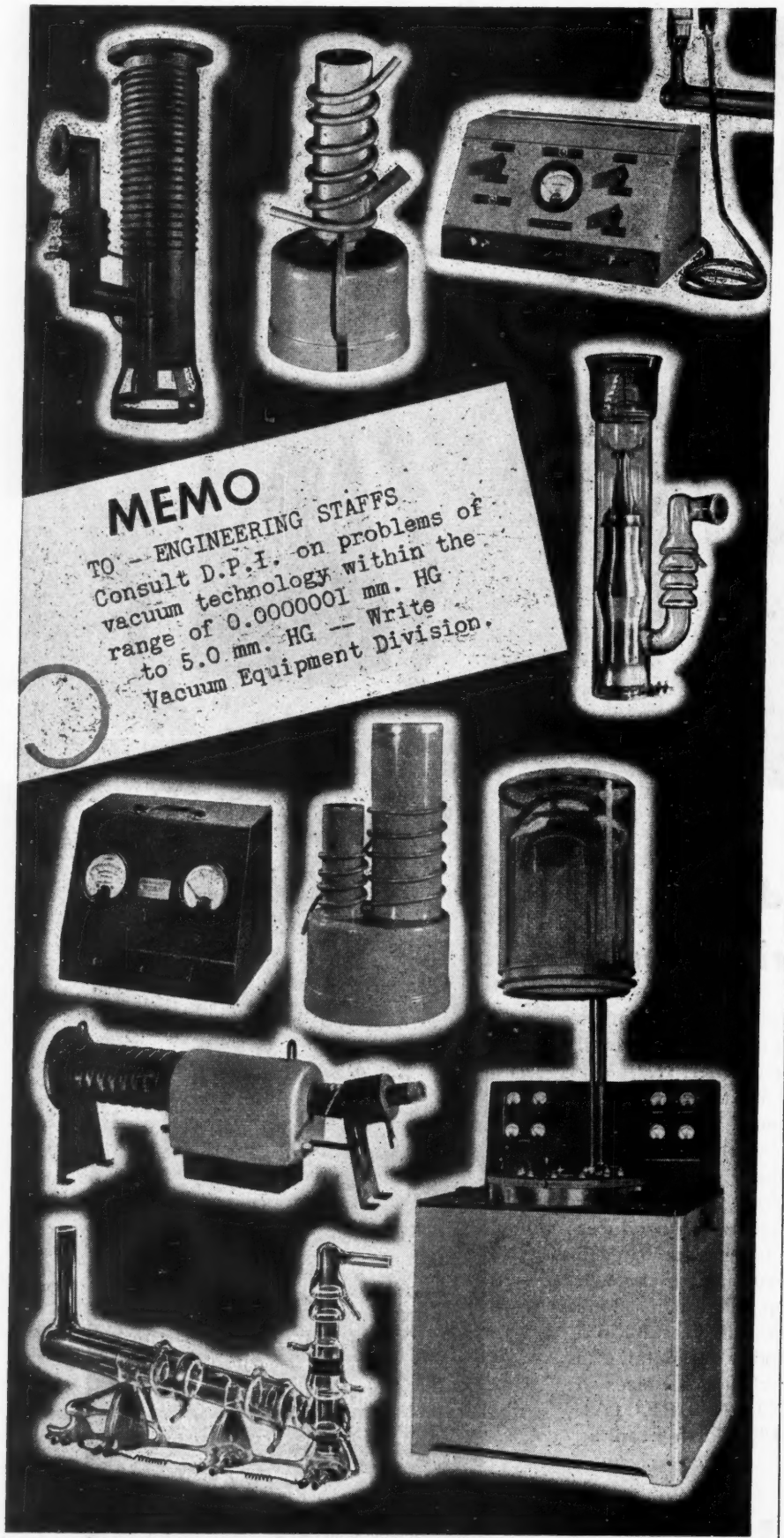
. . . produced by the 60000 D Sewing Head

Here's an effective, economical way to smiles of satisfaction to the food processor, the retail distributor and the individual customer! It's *really good packaging*, characterized by the finest type of bag closure. The Union Special DUBL-TAPE CLOSURE is sturdy, tight, economical to produce, eye-appealing, easy to open. It is the ideal closure for small paper bags, from 1 lb. to 25 lb. size. The 60000 D sewing head, which produces this closure, applies a strip of paper tape to each side of the bag top, runs a secure stitch through the tape and trims the bag top. This is all done simply, at low cost and automatically results in a strong, firm package. Write today for details on this and other equipment for closing all sizes of paper and fabric bags. UNION SPECIAL MACHINE COMPANY, 450 North Franklin Street, Chicago 10, Illinois.



FAST—Keyed to the output of standard filling or weighing equipment.
ECONOMICAL — Uses inexpensive cotton thread and paper tape.
EASY TO OPERATE—Inexperienced help can be trained to operate the machine in a few hours. Light, easy work.
DEPENDABLE—A precision built, quality machine designed for years of service.
SEMI-AUTOMATIC OR AUTOMATIC—For use as one operator machine or as part of completely automatic installation.
VERSATILE—Style 60000 DZ sewing head makes the bound-over tape closure on this range in sizes of filled bags.
ABOVE — George W. Haxton & Son closes bags of beans at 40 per minute with the Dubl-Tape Closure produced by 60000 D sewing head.

Union Special *Machine Company*


MEMO
TO — ENGINEERING STAFFS
Consult D.P.I. on problems of
vacuum technology within the
range of 0.0000001 mm. HG
to 5.0 mm. HG — Write
Vacuum Equipment Division.
DP INC. HIGH-VACUUM HEADQUARTERS
DISTILLATION PRODUCTS, INC.
Jointly owned by EASTMAN KODAK COMPANY and GENERAL MILLS, INC.
ROCHESTER 13, N. Y.

More Food Plants Get Merit Awards

FOR a second year of outstanding performance in the processing of food, 20 more food plants have been named to receive the U. S. Department of Agriculture "Star" award. First year "A" awards will go to 13 more plants.

The following plants have been approved for the "Star" award:

Edgar F. Hurff Co., Swedesboro, N. J.; D. E. Winebrenner Co., Hanover, Pa.; Fairmont Canning Co. plants at Fairmont, Waseca and Winnebago, and Minnesota Valley Canning Co. plants at Le Sueur, Blue Earth, Cokato, Winsted, Watertown and Winthrop, Minn.; Fredonia Canned Foods, Inc., Fredonia, Fuhremann Canning Co., Appleton, and Lakeside Packing Co. plants at Manitowoc and Sheboygan, Wis.; Stokely Foods, Inc. plants at Newport and Tellico, Tenn.; The Exchange Orange Products Co., Ontario, Calif.; Cedargreen Frozen Pack Corp., Wenatchee, and National Fruit Canning Co., Chehalis, Wash.

First Awards

"A" awards will go to the following plants:

Sheffield Condensed Milk Co., division of Sheffield Farms Co., Chateaugay, N. Y.; Withington Co., Providence R. I.; W. S. Wells & Sons, Wilton, Me.; Corkran-Hill & Co., Inc., Baltimore; Sharp Canning Co., Ohio City, Ohio; Independence (Iowa) Produce Co.; Texas Vegetable Oil Co., San Antonio; Mississippi Valley Co., Osceola, Ark; Cudahy Packing Co., Denver; Davis Brothers Fisheries Co., Inc., Gloucester, Mass.; The Borden Co., West Branch, Mich.; Diplomat Products, Inc., North Bergen, N. J.; Wenatchee Valley Foods, Inc., Wenatchee, Wash.

Low-Fat Chocolate Legal for a Time

UNTIL April 1, 1946, the Food and Drug Administration will not require observance of the minimum requirement of 3.66 percent of milk fat in milk chocolate or that nonfat milk solids not exceed 2.43 times the milk fat. All other provisions of the new definition and standard of identity for milk chocolate and all standards for other chocolate products do become effective October 1, 1945.

The six months' delay in enforcement of the two milk ingredients was authorized by F&DA at the request of the Association of Cocoa and Chocolate Manufacturers. Their request that all of the standards be postponed was denied.

SCHEDULE OF EVENTS

SEPTEMBER

14-15—National Meat Canners Association, annual conference, Nipper sink Lodge, Ill. (Restricted to representatives from each member organization.)

18-19—American Management Association, packaging conference, Hotel New Yorker, New York.

OCTOBER

15-19—American Dietetic Association, 28th annual meeting, Netherlands Plaza Hotel, Cincinnati.

THE TREND IS TO GAS

FOR ALL
HEAT PROCESSING OF FOODS

Bond Bakers secure

UTMOST ECONOMY **EXCELLENT QUALITY**

INCREASED SPEED OF PRODUCTION

. . . since selecting GAS for Doughnut Baking

Recently General Baking Company—the famous "Bond Bakers"—installed new, automatic Gas equipment for turning out doughnuts at their Brooklyn, N. Y., plant that has brought many advantages to this operation.

The economy of Gas is strikingly shown here—only one cubic foot of the fuel is required to do each dozen doughnuts to a turn, at the amazingly low cost of only 19/100ths of 1 per cent of the retail sales price. Greater speed of production is seen in the 1200 dozen delicious doughnuts that are turned out hourly by the three Gas fired, completely automatic units.

The cleanliness of Gas fuel and its contribution to pleasant working conditions are also emphasized in this installation. All together, this is a superb illustration of the functional application of Gas equipment, insuring to the user all those benefits which are inherent in this modern source of heat.

There is soundly engineered Gas equipment that will bring you all the advantages of Gas fuel for each of your specific operations. The Industrial Engineer of your local Gas Company will be glad to tell you all about it—at no obligation.

BUY WAR BONDS . . . SPEED FINAL VICTORY!

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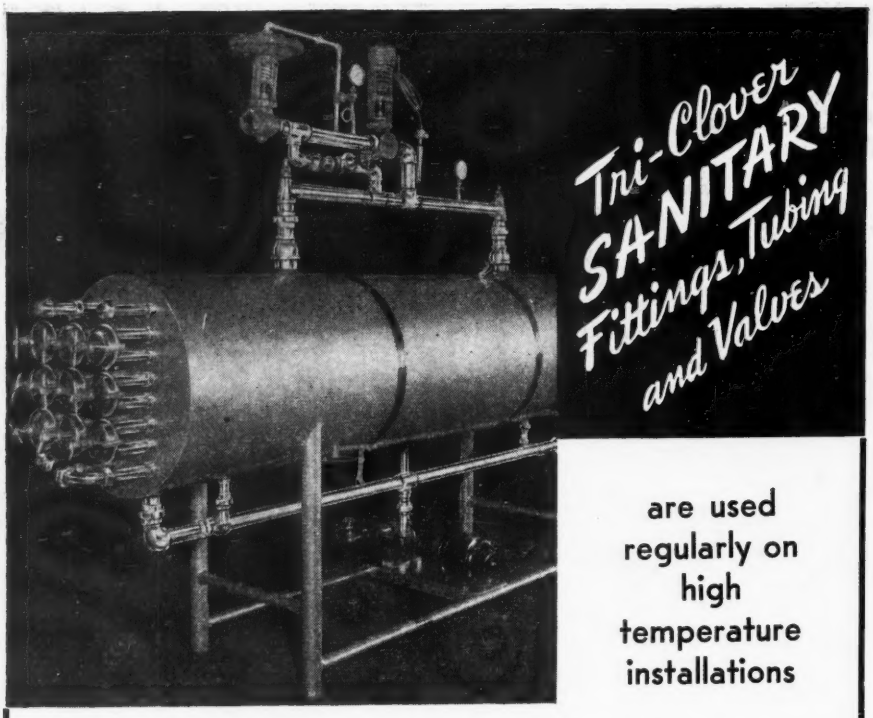
AMERICAN GAS ASSOCIATION
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.



are used regularly on high temperature installations

For over a quarter of a century it has been the constant effort of the entire TRI-CLOVER organization to design and produce progressively better Sanitary Fittings, Sanitary Tubing, Sanitary Valves and Sanitary Pumps — products of outstanding precision, durability and efficiency, promoting the highest sanitary standards. Milk distributing and processing plants all over America prefer the smooth, economical, trouble-free operation of the TRI-CLOVER Line.

Write for the TRI-CLOVER CATALOG

THE Complete Line

1. **Trialloy (Cupro Nickel) Sanitary Fittings**
2. **Fabricated Stainless Steel Sanitary Fittings**
3. **Pumps (Centrifugal—non-agitating) Trialloy and Stainless Steel**
4. **Custom Fabrication**
5. **Sediment Testers**
6. **Line Filters**

Standardized Accuracy and Interchangeability are YOUR Tri-Clover Guarantee.

ARMY E NAVY

TRI-CLOVER MACHINE CO.
2813 60th Street
KENOSHA, WISCONSIN

Try TRI-CLOVER

SANITARY FITTINGS VALVES *and* PUMPS

Geneva Station Forms Food Science Division

A NEW division of food science and technology has been created at the New York State Agricultural Experiment Station, Geneva, by merging the divisions of bacteriology and chemistry.

Dr. Elmer H. Stotz was named head of the new division, and activities of the new group are to be guided by a committee consisting of members of the former divisions. This committee will consist of Dr. Stotz, who was head of the chemistry division, as chairman, Dr. George J. Hucker and Dr. Carl S. Pederson, professors of bacteriology, and Dr. Zoltan I. Kertesz, professor of chemistry.

The program of the new food science and technology division will embrace investigations of concern to farmers, processors and consumers.

A new food research building and pilot plant has been authorized by the State's post-war planning commission and plans for the new building are well advanced.

New Tea Processing Method Is Developed

A NEW METHOD for processing tea, which reduces operating costs, has been developed by the Ceylon Tea Research Institute.

The green leaf is reduced almost instantaneously to a pulp by passing through stainless steel rollers. Fermentation thus initiated is complete in about an hour. The pulp is then dried in an ordinary tea dryer and can be compressed into tablets. The operation is completed in about two hours, which compares with the former 24-hour process of withering, rolling and grading.

Australia Produces Food for U. S. Forces

AUSTRALIA last year processed $120,000,000 worth of food for United States forces in the Southwest Pacific, Commonwealth Food Control authorities recently announced.

Items included: Canned meat, 94,000,000 lb.; butter, 22,400 lb.; cheese, 3,360,000 lb.; frozen meat, 163,500,000 lb.; dehydrated vegetables, 3,900,000 lb.; canned vegetables, 64,000,000 lb.; jam, 25,700,000 lb.; tomato juice, 9,600,000 lb.; egg powder, 7,000,000 lb., and canned fruit, 32,000,000 lb. Australia also supplied 220,000 dozen eggs and 1,530,000 gallons of fruit juices.

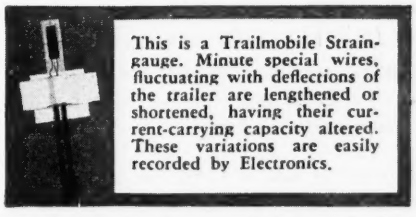
Trailmobile Engineers Create ELECTRO-DYNAMIC TESTING
Permits New INFINITELY ACCURATE ANALYSIS, Correction of basic design
BEFORE TRAILERS ARE PRODUCED!

Now every Trailmobile off the production-line is assured of being as vitally strong as modern metals can make it—yet *utterly* without superfluous poundages of steel that cut payloads down!

This new, complete Electron-ometer, on wheels, is hauled along by every experimental "pilot-model" at Trailmobile, *while* it undergoes *violent* road-testing—light, loaded; while it is roughly coupled and uncoupled, subjected to long, *terrific* road-beating!

Electron-ometer lines run to as many as 48 "strain-gauges" at one time, all temporarily "welded" to the trailer in as many critical "test-spots."

Then—and *now by Electronics!*—*every* deflection, *however* slight, occurring *anywhere in the trailer,* is discovered, computed, identified!—revealed *completely* by "charting" pens of the Oscillograph.



This is a Trailmobile Strain-gauge. Minute special wires, fluctuating with deflections of the trailer are lengthened or shortened, having their current-carrying capacity altered. These variations are easily recorded by Electronics.

It puts the finger—"electronic fingers," *precisely on each spot,* exactly where lighter or heavier metal, or different design is beneficial. It assures *Trailmobile* of *positive* design and engineering effectiveness *impossible ever,* for the industry, before!

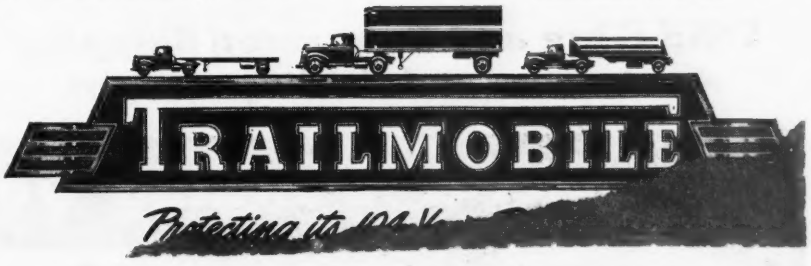
It is wartime ingenuity delivering *full realization* of the "Trailers we all hope to see Tomorrow"—Trailmobiles!—with a combination of *extra* strength and *lightness* of weight *unparalleled!—correctly* engineered, *in advance*—by *electronics!*

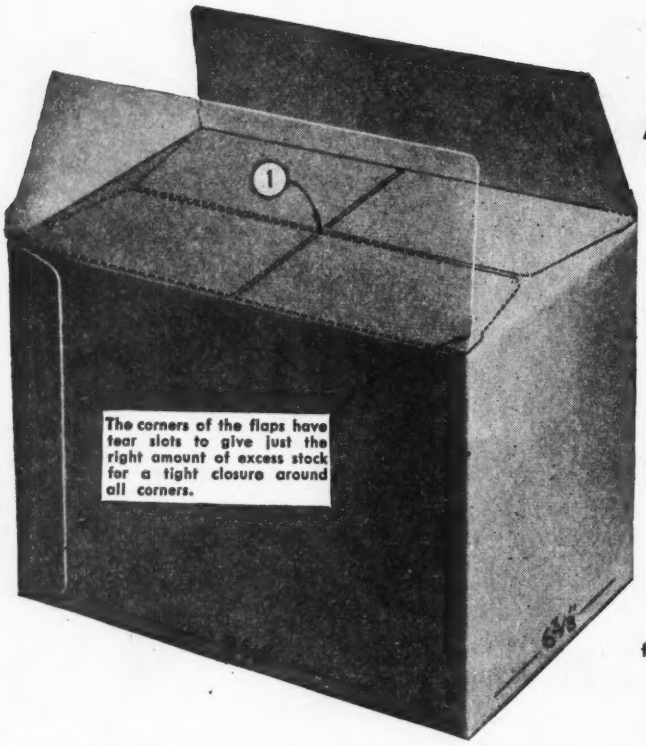
These are the qualities; this is the excellence, which Trailmobile endeavors to contribute to the entire Transportation Industry.

TRUCK DEALERS

You will find it advantageous to contact our nearest Trailmobile Branch, and to discuss Postwar Trailer Opportunities!

The Trailmobile Company
Cincinnati 9, Ohio




The corners of the flaps have tear slots to give just the right amount of excess stock for a tight closure around all corners.
6⅝"

These Boxes Are Made From Waste Paper

Save It

THE ARMY RATION 10-IN-1 INNER CARTON

for the rations that need moisture protection.

Tightest in Food Cartons

The Army's Ration Ten-in-One Inner Carton, designed to keep the soldiers' rations dry and edible, through the many hazards of transport and field storage, is a stiff test of box making. The Q.M.C. specifications are as follows:

The board shall be well-sized throughout. Test — When held under water as specified for 10 minutes, a 6" square section shall not absorb more than 4.0 grams of water.

The board shall permit penetration of the microcrystalline wax (specified for dipping the sealed cartons) *to a depth of not less than 35% of its thickness in 5 to 10 seconds of contact.*

No overlap of inner and outer flaps is permissible, nor shall they gap more than 1/16" (1). No scores shall check or crack. This requires keeping moisture content of board between 6 and 8%; enough to prevent cracking at folds, but not enough to cause shrinkage and inaccurate die-cutting.

Final Test — A sample of ten cartons is taken from each day's production, sealed and dipped twice in the molten wax (0.005" film), and then immersed in water for 24 hours. At least 90% of them must be dry inside when taken out and opened the next day.

We have made millions of ration cartons meeting these specifications for Uncle Sam. Your peacetime packaging needs may not call for any boxes so precisely made. We can, however, design and manufacture whatever you will need in

Solid Fibre and Corrugated Shipping Containers and Folding Cartons

mmel & Downing Co.

WISCONSIN

Lend-Lease Sugar Eyed by Senators

MEMBERS of the Senate Small Business Committee had begun scrutinizing lend-lease sugar stocks when lend-lease ended. Existence of the lend-lease stocks was revealed at a committee hearing at which Secretary of Agriculture Anderson and Price Administrator Bowles expressed the opinion that the present critical sugar shortage will continue through next year. Harold B. Rowe, of the Foreign Economic Administration, told the committee that 167,000 tons of sugar intended for five lend-lease recipients is mostly still undelivered and Chairman Tom Stewart promptly suggested this stock might be tapped to help out American industrial users short of supplies. Another member of the committee, Senator Kenneth Wherry, of Nebraska, suggested that "we ought to know whether there's any sugar or anything that looks like sugar that we might be able to get."

Georgia Canners Show Rapid Ten-Year Growth

GEORGIA'S commercial canning companies, already turning out nearly 3,000,000 cases of canned foods each year, have the physical equipment to produce a much larger volume of goods in the postwar years, according to Dr. H. L. Cochran, horticulturist of the Pomona Products Company at Griffin.

Ten years ago, according to Dr. Cochran, there were only five or six commercial canning companies operating in the state. These plants, which are still in operation, have increased their output from five to ten times and new plants have helped boost Georgia's total production of canned foods.

According to a report issued by the University of Georgia's College of Agriculture in 1944, Georgia ranks 20th among the states in the nation in the number of commercial canning plants.

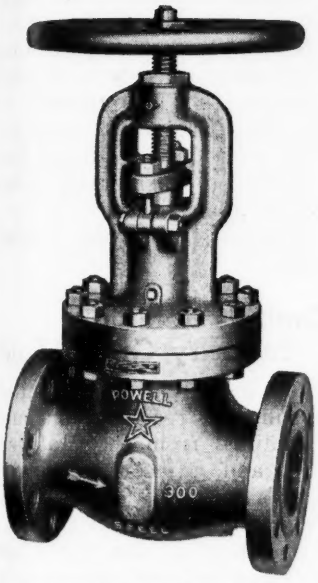
Alaskan Processing

FOLLOWING a first-hand survey of Alaska, A. L. Ganson, manager of the Alaska department of Seattle Chamber of Commerce, advises:

Lack of adequate highways is retarding the potentially great agricultural development of the territory. The problem of marketing farm products is being met to some extent by the introduction of modern food-processing methods, such as quick freezing

PURE NICKEL
MONEL METAL*
INCONEL*
VALVES

The Solution to many a flow control problem



Class 300-pound Cast Steel Gate Valve with Monel Metal trim.

All-Pure-Nickel, all-Monel-Metal and all-Inconel Valves as well as valves with Monel Metal trim (internal working parts) are another outstanding Powell contribution to help solve Industry's flow control problems. In all services where corrosion and excessive heat or cold are encountered; where absolute purity of the end product must be maintained; and for the handling of steam, water, acid, alkalies and many other media these valves are superior to all others. This has been conclusively proved by performance records in leading plants throughout the nation.

For twenty years, Powell Engineers and the Powell Special Alloy Valve Division have designed and fabricated valves in a wide variety of pure metals and special alloys to meet every flow control requirement of Modern Power, Chemical, Food Processing and Textile Plants, Oil Refineries, etc. This specialization is your assurance of satisfaction. Write NOW for details and your copy of our new booklet "Powell Valves for Corrosion Resistance."

The Wm. Powell Co., Cincinnati 22, Ohio

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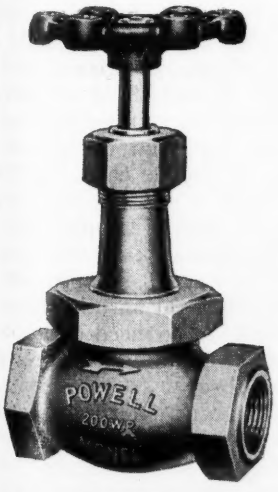
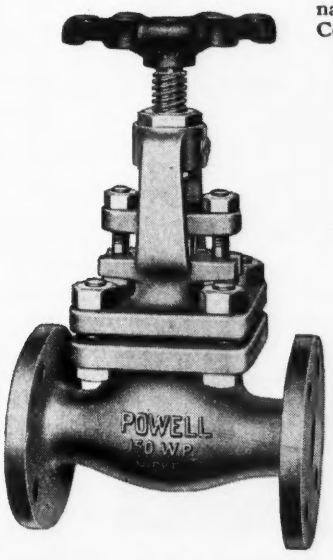
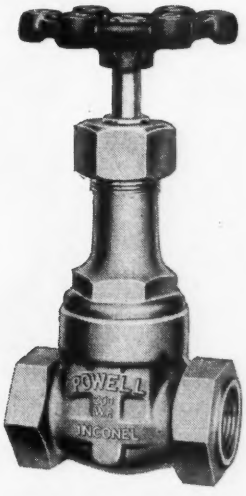
*These names are registered trade-names of the International Nickel Company, Incorporated.



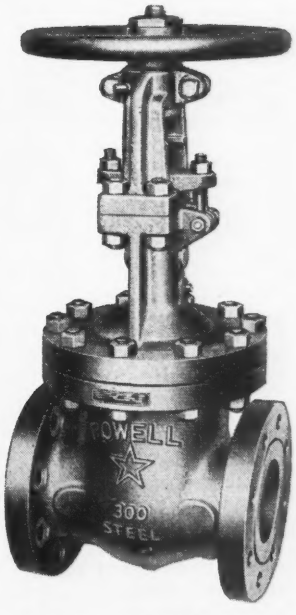
200-pound Globe Valve. Available in All Pure Nickel, All Monel Metal or All Inconel.



150-pound O. S. & Y. Gate Valve. Available in All Pure Nickel, All Monel Metal or All Inconel.

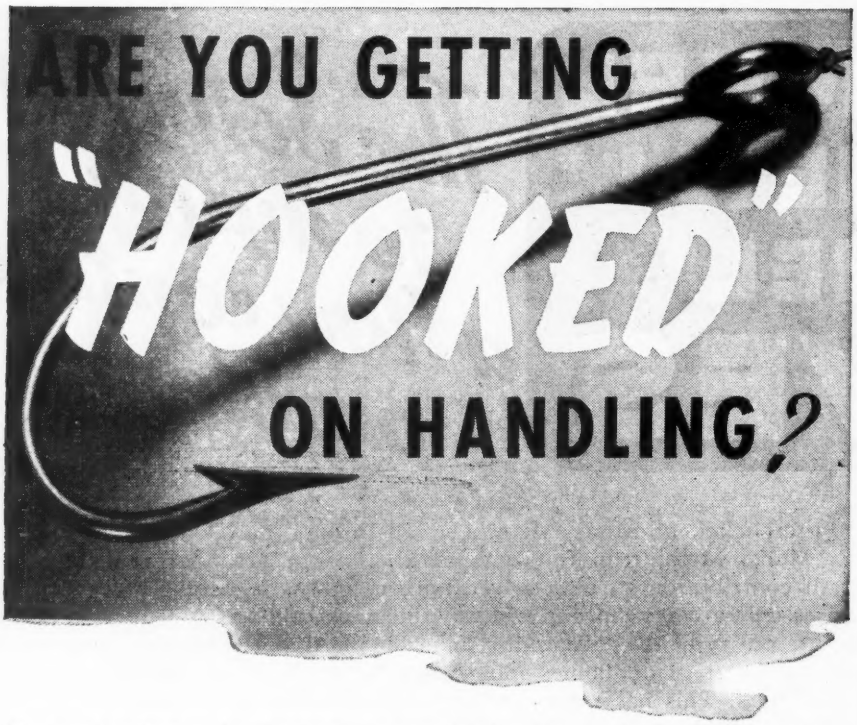


200-pound Gate Valve. Available in All Pure Nickel, All Monel Metal or All Inconel.



Class 300-pound Cast Steel Globe Valve with Monel Metal trim.

POWELL VALVES



You can't afford to be "hooked" by materials-handling problems, by out-moded methods of moving, piling and stacking that lose you time and money—affect the efficiency of your whole business structure!

There is a SIMPLE, SPEEDY way—with Rapid-Wheel Portable Gravity Conveyor. Light and strong, easy to set up and operate, Rapid-Wheel Conveyors are well-adapted to use wherever there is a handling job to be performed. They eliminate the need for slow, costly hand labor and are soundly constructed from the best of materials to give you years of economical, dependable service.

The new, handy Cam-lock standards provide a full range of adjustments up to 50" operating height; fold completely under conveyor frame when not in use. Self-adjusting, easily locked, these standards make each Rapid-Wheel Conveyor section a compact, self-contained unit.

Investigate this labor-saver thoroughly; write for full particulars TODAY. Hundreds of users are finding the Rapid-Wheel Portable Conveyor the answer to handling problems — proving to be the best investment they ever made.

OFFICES IN PRINCIPAL CITIES

Manufacturers of
STEEL FORGED CASTERS · TRUCKS · CONVEYORS · POWER BOOSTERS

The Rapids-Standard Co., Inc.

Sales Division—361 Peoples National Bank Building, Grand Rapids 2, Michigan

Roaches Allergic to New Flooring Cement

A NEWLY found flooring, which is said to act as a roach repellent, has been developed at the Mellon Institute of Industrial Research.

The flooring incorporates finely divided copper powder in magnesium oxychloride cement and can be applied three-sixteenth to one quarter inch in thickness, on any floor surface, including wood. After a three-week setting period, the cement has been found to be effective not only against roaches, but it also has a lethal effect upon bacteria, yeast and molds.

The mixture is applied in much the same manner as ordinary cement. Its physical characteristics, however, more closely resemble plastic material. Its strength is said to exceed that of portland cement, yet it is quite resilient and can be deformed considerably without cracking.

The material has been named "Hubbellite."

Tin Controls Remain, Industry Group Told

TIN CONTROLS must be continued until a sufficient reconversion supply is obtained from the Malayan Peninsula and adjacent territory, the world's principal tin source, War Production Board officials informed members of the Tin Plate Industry Advisory committee at a recent meeting.

Tin mill products requirements, principally tin plate, in the fourth quarter will be approximately 840,000 tons minimum, compared with 933,000 tons in the third quarter. The fourth quarter figures included 575,000 tons for food containers; 20,000 tons for bottle caps; 25,000 tons for other types of closures; 6,500 tons for home canning; 40,000 tons for Canada; 95,000 tons for Lend-Lease now stopped and about 70,000 tons for all other uses.

The recently announced cutbacks in Naval shipbuilding programs may reduce bronze requirements, which in turn will cut the demand for tin for new construction, but much bronze will still be needed for maintenance repairs and operating supplies.

WPB officials expressed some concern over an increase in tin consumption in 1945 over 1944. They pointed out that tin consumption amounted to 47,000 long tons in the first six months of 1945 or at an annual rate of 94,000 long tons, compared with tin consumption of 90,000 long tons in 1944.

We've Spilled the WORKS!

All the works—two discs and two wedges—four parts—the entire working part assembly of a Darling Double Disc Gate Valve. The seats are parallel. The discs are *fully revolving*, seating in a different position *each time* the valve is operated. This means tighter seating, less wear, longer operation, and lower maintenance costs with Darling Gate Valves. All four working parts are uniform and positive in action. They are simply designed, with no pockets to collect sediment or prevent free and easy movement. Any part can be replaced quickly and inexpensively without removing the valve from the line. They cannot be incorrectly assembled or become disengaged while in service. It's an assembly that will more than pay its way in your plant.

At your service are the engineers of the Darling Valve & Manufacturing Company. They can solve your valve problems without cost or obligation to you. Wire or write, setting appointment at your convenience.

Darling offers you a quality line of longer-lasting Gate Valves. They come in Fully Revolving Parallel Seat Double Disc, also in Taper Seat—Slotted and Solid Wedge types. In service pressures up to 3000 pounds, you can get Darling Gate Valves in Cast Iron, Bronze, Forged Steel, Cast Steel, and Corrosion Resistant Alloys. Darling also manufactures Compression Type Fire Hydrants, Check Valves, Motor and Cylinder Operated Valves, and many accessories.

TRADE DARLING MARK

VALVE & MANUFACTURING CO.

WILLIAMSPORT, PA.

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Send me Perry's Chemical Engineers' Handbook for 10 days' examination on approval. In 10 days I will send $1.00, plus few cents postage, and $3.00 monthly for three months thereafter, or return book postpaid. (Postage paid on orders accompanied by remittance of first installment.)

Name .....

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City and State .....

Company .....

Position .....Food 9-45

(Books sent on approval in U. S. only.)

INDICATORS

Production

Flour production in July increased almost 2,000,000 sacks over the output of a year ago, according to *The Northwestern Miller*. The July output was 15,222,857 sacks, representing 73 percent of the total for the United States.

Ice cream sales last year were 8.99 percent higher than in 1943, according to International Association of Ice Cream Manufacturers. Reports from 747 plants in the United States showed a total 1944 output of 269,087,218 gal. Canada, with 46 plants reporting, produced 7,903,396 gal.

Canned vegetable packs reported by National Canners Association for 1944 and 1943 are given below (basis 24 No. 2's in thousands—000 omitted):

	1943	1944
Asparagus	3,860	4,141
Green beans	20,658	16,645
Wax beans	2,255	1,551
Lima beans	1,879	1,647
Beets	6,059	7,889
Carrots	2,384	3,131
Sweet corn	28,755	25,089
Green peas	35,052	31,524
Pumpkin and squash	2,007	2,977
Sauerkraut	3,722	
Spinach	7,381	9,957
Sweet potatoes	1,215	1,680
Tomatoes	29,269	26,099
Tomato juice	22,849	30,809

Creamery butter production in June was placed at 171,330,000 lb.. This was the lowest for the month since 1925, being 4 percent below June last year and 14 percent lower than the 10-year average.

Meat production—beef, veal, lamb and pork—in Federally inspected packing plants, was 1,115,000,000 lb. in July, 10 percent less than in June and 22 percent less than in July, 1944, according to data issued by American Meat Institute.

Frozen fruit production this year is expected to approach the 1944 pack of 330,000,000 lb., the U. S. Department of Agriculture states. This is about three times the 1935-39 average.

Materials

Sweet corn production for canning and processing was estimated at 1,235,700 tons on the basis of August 1 reports. This compares with 1,009,300 tons last year and a 10-year average of 880,000 tons.

Tomato production, for processing, was estimated on August 1 to total 3,066,100 tons, 3 percent less than last year but 41 percent above the 10-year average.

The wheat crop totals a record 1,146,000,000 bu., while the oats crop of 1,546,000,000 bu. broke a record that stood for 25 years. Barley production is expected to be 269,867,000 bu., 5 percent below 1944. Rye production is forecast at 27,883,000 bu., about 8 percent above last year. The 1945 rice crop looks like a record 76,000,000 bu.

Corn crop prospects improved in July to a predicted tonnage of 2,844,000,000 bu. However, early frosts would cause large quantities of the crop to be soft.

Deciduous fruit crops are estimated at 12 percent below 1944. Peaches are a record large crop, apples a record low. The cherry crop is 34 percent below last year.

Green pea production for processing was estimated in mid-July to reach a record 462,785 tons.

Snap bean production for processing was expected to reach a near-record tonnage.

Soybean prospects are for a 188,284,000 bu. crop, 2.4 percent below last year.

Peanut acreage is 3,238,000 acres, 3 percent above last year.

Dry edible bean production is forecast at 14,714,000 bags (100-lb., uncleaned), 9 percent below the quantity produced in 1944.

Dry peas produced this year are expected to total 5,500,000 bags (100 lb.), a reduction of about 1,000,000 bags from 1944.

Sugar beet production is forecast at 9,332,000 tons, or 38 percent higher than last year.

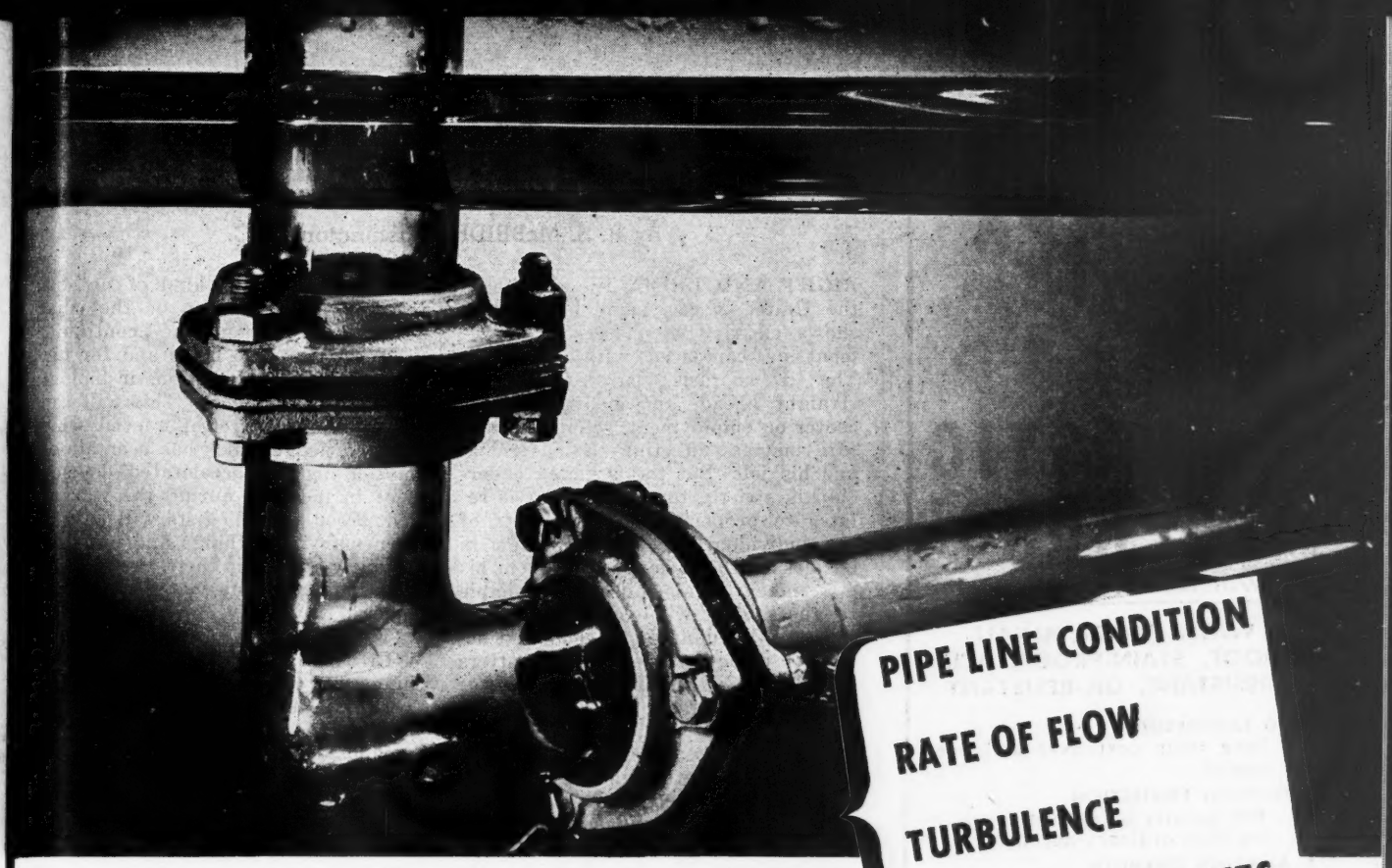
Sugar cane output is estimated at 6,976,000 tons compared with 6,148,000 tons last year.

Index

Business activity index of *Business Week* dropped to 207.0 for the week ending August 18, compared with 218.8 a month earlier and 233.9 a year ago.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded August (thousands)	Total Awarded 1945 (thousands)
Bakery	$ 50	$ ...	$ 393
Beverages	535	...	732
Canning and Preserving	40	...	1,100
Cold Storage	766	130	2,068
Confectionery	...	...	150
Grain Mill Products	547	1,045	4,140
Ice, Manufactured	500	...	504
Meats and Meat Products	359	75	597
Milk Products	875	685	3,351
Miscellaneous	620	180	9,538
Complete 1945 total	$4,292	$2,115	$22,573



In GLASS you can SEE

WHEN you use PYREX brand Glass Pipe you need never wonder what is happening inside your pipe lines. Every inch of this transparent pipe is open to inspection at all times. You can see the condition of the pipe line and its contents at every processing stage.

The following qualities are the reasons why PYREX Pipe has been found so valuable and thoroughly practical in so many industrial applications:

VISIBILITY PLUS

Cleanliness—PYREX Pipe is easy to clean. There are no rough edges or deep crevices to catch and hold dirt or scale. And because of its transparency, you can *see* when it is clean.

Corrosion Resistance—PYREX Pipe resists the chemical attack of food acids and brines—an important factor in product protection. It reduces replacements due to corrosion to a minimum.

Temperatures—Operating temperatures as high as 250°F., and under certain conditions, as high as 400°F. are permissible. Resistance to sudden temperature changes means that even a cool pipe line can be cleaned by flushing with hot water or steam.

Ease of Installation—Your own men can install PYREX Pipe. No special tools or training are required. Pipe, fittings and hardware are delivered ready for assembly.

Low Cost—The initial cost of PYREX Pipe is about the same or less than the cost of full-weight copper or brass of comparable sizes. Its long life and trouble-free performance make it the most economical pipe you can buy.

Sizes and Fittings—PYREX brand Glass Pipe is now available in 1″, 1½″, 2″, 3″ and 4″ inside diameters. A complete line of PYREX fittings includes ells, tees, return bends, laterals and reducers. Adaptor connections for joining PYREX Pipe to all types of other standard fittings are available.

For more details and assistance in adapting this remarkable glass pipe to the solution of your liquid conveying problems, write to Industrial Sales Dept. FI9.

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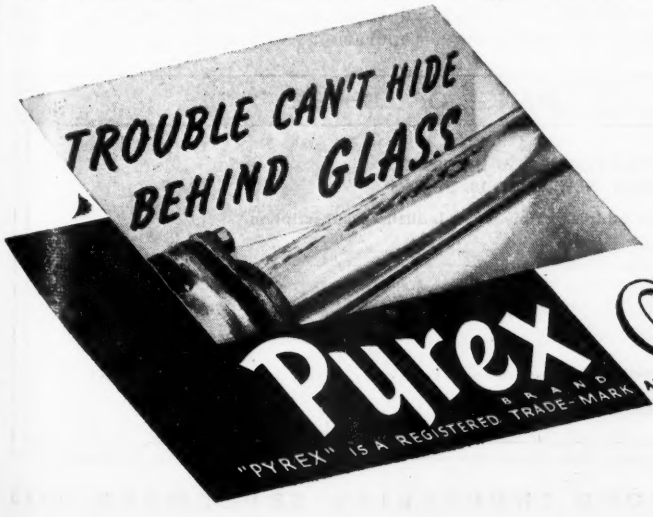

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NO LAUNDERING
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TOPMOST PROTECTION
Far greater safeguard to clothing than ordinary aprons!

AMAZING STRENGTH
Plus lightness in weight for utmost wearing comfort!

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4 SIZES

——PRICES — SIZES — COLORS——

GRAY
27 x 36...$8.40 per doz.
30 x 36... 9.78 per doz.
36 x 40...11.90 per doz.
36 x 44...12.60 per doz.
Full Length Sleeves $9.66 per dozen pair
Leggings, Hip Length $11.90 per dozen pair

ALL WHITE
27 x 36...$6.88 per doz.
36 x 36.. 7.65 per doz.
36 x 40.. 9.35 per doz.
36 x 44.. 10.18 per doz.
Full Length Sleeves $7.15 per dozen pair

BLACK NEOPRENE
27 x 36..$12.90 per doz.
30 x 30.. 14.00 per doz.
36 x 40.. 18.33 per doz.
36 x 44.. 20.50 per doz.
Full Length Sleeves $12.90 per dozen pair
Leggings, Hip Length $23.50 per dozen pair

OLIVE GREEN
27 x 36.. $6.27 per doz.
30 x 36.. 6.71 per doz.
36 x 40.. 8.35 per doz.
36 x 44.. 9.24 per doz.
Full Length Sleeves $6.60 per doen pair

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What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

RIGHT AND LEFT—The change in the United States made by Truman shows clearly two classes of movement as compared with Roosevelt. The Democratic party continues straight ahead, and a little left of center on employment, relief and welfare matters affecting the individual and his job. But the Truman leadership is strictly to the right as it relates to property and the rights of the individual citizen to engage in business without competition from his government. It is much more simple to guess what will come next in the plans of Washington if clear distinction is made between these matters of personal rights and the matters of property rights.

CONTROLLED OUTLETS—Aggressive business methods sometimes have not had much encouragement even when they have promised to increase the total supply of meat on the legitimate market. OPA has forbidden the management of slaughtering enterprise by firms which would supply their own controlled market outlets, except under very restricted conditions. The ground for the refusal was nominally that this permitted big firms to deprive old small customers of their meat supply at the source. The real reason seems to have been in part that the bureaucrats want to decide all of these matters. Firms contemplating change in production plans for the benefit of their own distributing systems must therefore be rather sure that these Washington policy makers will say yes to new plans before irrevocable commitments of this sort are made.

MORE RESEARCH—Previous proposals for government support of scientific research will be speeded by the new enthusiasm of Washington which has grown out of atomic bomb success. Obviously, there will be more research on national-defense problems. Almost equally certain is large new spending on research in the fields of medicine and public health. And more than probable is the establishment soon of some kind of national research foundation to be the super agency for formulating continuing programs in these fields and for new fundamental investigations in biologic and physical sciences. This will rapidly refill the barrel of unused scientific knowledge which has been almost emptied by the accelerated development in industry during the war period. Food technologists will have to learn many new things and put them promptly to use if their parts of the food industries stay abreast of the leaders.

WILL COST MORE—All kinds of things are going to cost more in the postwar period. This will result from wage increases and will cause more demands for further increases in wages. Average hourly wages rose from 44 to 69 cents between 1941 and 1945 in one of the fields most nearly comparable to food. Food executives who have not laid plans in accordance with this trend probably are out of touch with the realities of Washington.

SALT SALES "ILLEGAL"—Violation of antitrust laws is charged against one of the largest salt distributors on the ground that use of a patented dispenser of salt tablets was conditioned on the purchase of salt from the company which leased the dispenser. This shows how very carefully interlocking sales policy must be scrutinized in order to stay within the antitrust laws. Even valid patents cannot be used by the owner to influence the sales or use of some other commodity without incurring the danger of a monopoly charge.

TIN, THE BOTTLENECK—Probably no other scarce commodity is now so significant in governing reconversion to peace programs as is tin. There is no telling how long it will take to reestablish adequate supplies of that metal for can manufacture and for the alloy and solder production essential for many civilian operations. At least for a brief pe-

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New Address .....

New Company Connection .....

New Title or Position .....

riod of months, the number of automobiles which can be made is going to be determined by the quantity of tin which they have to use. And every food technologist knows that very inferior tinned containers are the best that he can get, if he can get any at all for early use. Planning for the present to do without tin altogether is the best policy if possible.

BUTTER FOR SOAP—Any firms selling for soap making any commodity that sounds like a food must be very careful, or they will be subject to sharp public criticism. Even butter so rancid as to be inedible and the cheese bandages and residues sold for soap making by certain packing and processing houses have flashed back to singe quite severely the public relations officers of those firms involved.

It is not enough to be right in these matters; it is important also to *seem* that way from the viewpoint of the housewife who wants more cheese and butter.

THE ANNUAL WAGE—Certain firms have had the blessing of War Labor Board on new wage contracts which guarantee certain minimum annual wage arrangements for their workers. Some of these provide a minimum guarantee of 40 weeks work per year; and others go the limit with a 50- or 52-week promise. Those food industries which are highly seasonal cannot adopt such policies, but avoidable seasonal characteristics are going to be squeezed out of many industries by demands of this sort. Thus the food technologist is confronted with a new type of technologic planning in order to get the maximum time spread for each class of employment. Fortunately increasing the length of seasons of work also decreases the unit cost for capital charges and overhead. Thus we have now a double incentive for better planning.

BRITISH POLITICS—American food industries will be affected by the change of the political situation in Great Britain, but probably no more and no less than the rest of business. The British Labor Party is probably more conservative than the New Deal in most respects. It will tend to nationalize—as rapidly as feasible—coal, transportation, power, banking and perhaps a few other parts of British enterprise. But from Washington, it appears that the burden on industry in Britain is likely to be less than the strains imposed here by the New Deal efforts of the middle 30's. And the repercussions in the United States probably will be altogether obscured in the confusion of postwar reconversion and the attendant problem of finding new kinds of employment for 10 million men from the military services and almost a like number who no longer will make munitions of war.

shopping for BETTER HEALTH

When the modern homemaker makes a tour of wartime food markets, she is shopping for *higher* nutritional values... shopping for better health. And, today, that kind of buying is more important than ever because shortages in merchandise have narrowed the range of her selections.

We suggest the fortification of your products with Monsanto Mineral Supplements because they give homemakers the something extra they are looking for in foods. And, the addition of essential iron, calcium and phosphorus gives your retailers extra values to sell. Food fortification with Monsanto Mineral Supplements is inexpensive both to the manufacturer and the consumer.

Monsanto Mineral Supplements have exceptional purity. Monsanto derives its phosphoric acid and food-grade phosphates, from which the supplements are made, from Monsanto-made phosphorus of better than 99.9 per cent purity. Monsanto is America's largest producer of elemental phosphorus.

Being the leader in the production of phosphorus and its derivatives, Monsanto is in position to offer you valuable technical advice. If you wish information on food fortification with Monsanto Mineral Supplements, or samples of these products, please write the nearest Monsanto office or MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second St., St. Louis 4, Missouri.
District Offices: New York, Chicago, Boston, Detroit, Charlotte, Cincinnati, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

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SODIUM FERRIC PYROPHOSPHATE
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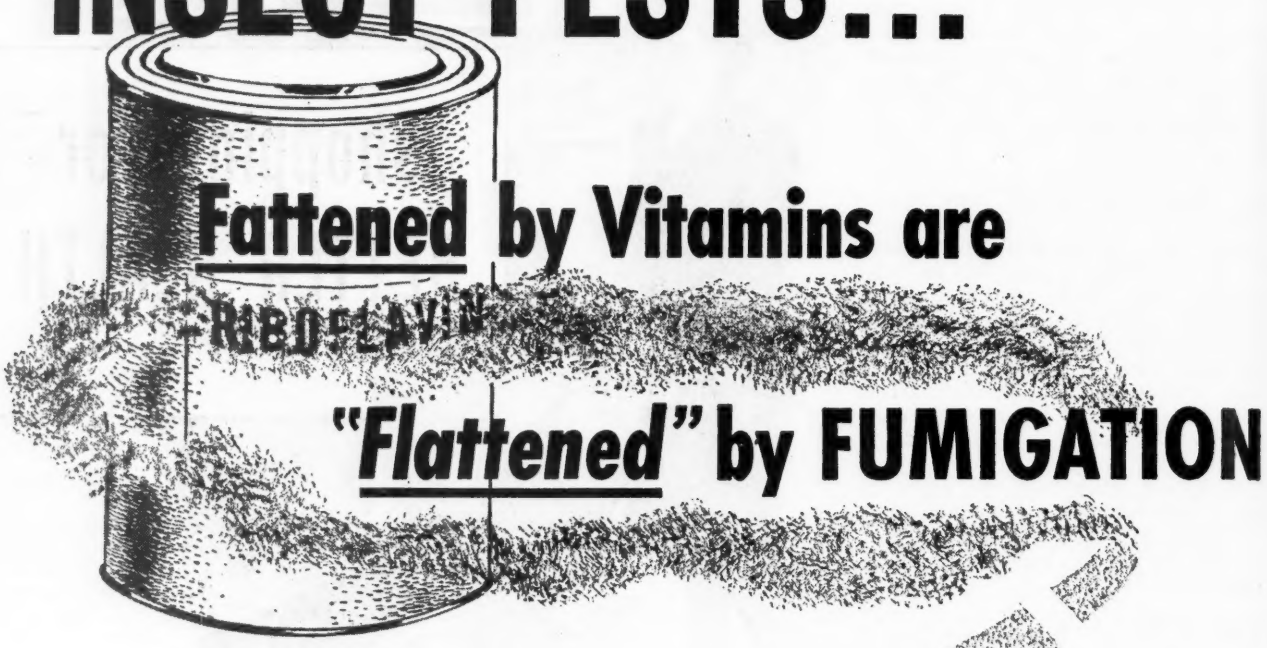

Fattened by Vitamins are "Flattened" by FUMIGATION

"Pepped up" by today's vitamin enriched foodstuffs, flour beetles and other pests are making themselves more of a problem than ever. As one report put it recently, "...the flour beetle produces many more progeny in enriched flour than in nonenriched flour."

There's only one way to handle the problem, and that's by *fumigation.* Fumigation with Liquid HCN gives you maximum kill at minimum cost... makes your product even more satisfactory to inspectors and customers. For Liquid HCN kills *all* stages of insect life, from egg to adult. It is harmless to foodstuffs and equipment... is safe, quick and convenient to use... is adaptable to all sizes of mills, warehouses, and food processing plants.

Adopt a preventive plan *now!* Assure yourself of a positive, efficient fumigation job by consulting an Industrial Fumigation Engineer. He will be glad to go over your pest control problem with you... and, if you wish, handle it for you. If you don't happen to know the Industrial Fumigation Engineer in your territory, we'll gladly send you his name. You incur no obligation.

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Insecticide Department • *A Unit of American Cyanamid Company*

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SPECIFY THE FUMIGANT PREFERRED BY EXPERTS

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INDUSTRY

The Beet Sugar Development Foundation has been organized in Denver as a nonprofit organization to develop and perfect labor-saving methods in sugar production. Representing domestic processors in 18 states, who produce about 3,000,000,000 lb. of beet sugar annually, the foundation will concentrate on agronomic research, methods for mechanization of beet culture, and experimental work affecting growing and harvesting.

Berg Pretzel Co. is constructing a modern plant at Leetonia, Ohio. The completed structures will house a potato chip industry and a modern pretzel bakery.

California Consumers Corp., Los Angeles, recently has received authorization to add new cold storage equipment to its Pasadena frozen foods plant. Estimated cost of the expansion program is placed at $294,000.

Case-Swayne Canning Co., Merced, Calif., has announced the purchase of Aladdin Co. plant in North Portland, Ore.

Cherry Growers, Inc., Traverse City, Mich., has been granted permission to construct a $105,000 four-story cold storage building, for storing fresh fruits and vegetables.

Christian Brothers Winery near Napa, Calif., recently purchased the Mount Tivy Winery, Reedley, Calif. The Tivy Winery has a storage capacity of 2,600,000 gal., a brandy distilling capacity of 9,000 gal., and a crushing and pressing capacity of 500 tons of grapes daily.

Cleveland (Ohio) Arctic Foods, Inc., has been formed with authorized capital of $50,000. The principals are Carl E. Sotz, Robert L. Ross and Russell Williamson.

Corn Products Research Foundation has made a grant of $6,000 to the University of California, for study of the manner in which starch and other carbohydrates are formed in plants. The project is under the direction of Dr. W. Z. Hassid, who, along with his coworkers, Dr. H. A. Barker and Dr. Michael Doudoroff, was the first to synthesize sucrose in the laboratory from the simpler compounds, fructose and glucose phosphate.

J. H. Doty Packing Co., Amarillo, Tex., has been purchased by C. W. Furr, owner of the Furr system of supermarkets in Amarillo.

B. F. BUCHANAN

The American Maize-Products Co., New York, manufacturer of products from corn, recently promoted Dr. B. F. Buchanan to supervisor of research. He will be situated in the Roby, Ind., laboratory.

RICHARD W. KOCH

H. I. Peffer, president of White Rock Corp., recently announced the election of Richard W. Koch as executive vice-president. He was most recently assistant to the president of Brewing Corp. of America.

General Foods Corp. has acquired the Northland Dairy Co., Evart, Mich., processor of milk products for manufacturing purposes.

General Mills, Inc., has announced the purchase of land, buildings and equipment of the Northern Oats Co., Minneapolis. The property consists of an 800-barrel-a-day mill for the processing and packaging of rolled oats, grain storage elevators with 300,000-bu. capacity, and a group of warehouses.

Grape Belt Preserves, Inc., has let a contract for a $400,000 canning factory for processing grape and tomato products at Westfield, N. Y.

Grocery Manufacturers of America, Inc., has announced the appointment of Frank J. Cogan as assistant to the president.

International Minerals and Chemical Corp., Chicago, has begun construction of three storage tanks near San Jose, Calif., and it is reported that the company soon will start construction on a $1,000,000 plant there. The first plant of its kind in the West, it will produce monosodium glutinate from the protein of concentrated beet-sugar-waste liquors from California sugar refineries. The product is used to impart a meaty flavor to certain food products. F. H. Catterson is production superintendent of the plant.

Midfield Packers is constructing a plant for processing, packing and freezing fruits and vegetables at Olympia, Wash.

Roma Wine Co., Fresno, Calif., is reported to be negotiating for the purchase of the Trocha Winery located in southern Tulare County. The purchase price is reported to be approximately $2,000,000.

James Vernor Co., Detroit bottlers, has announced plans for expansion of the company's activities into every state.

G. L. Webster Co., Cheriton, Va., food packing plant, was damaged by fire recently to the extent of $1,000,000. Other fires reported during the month were: The Valley Evaporating Co., Wenatchee, Wash., with loss estimated at $200,000, and Hood River, Ore., Apple Growers Association, where loss was estimated at $100,000.

PERSONNEL

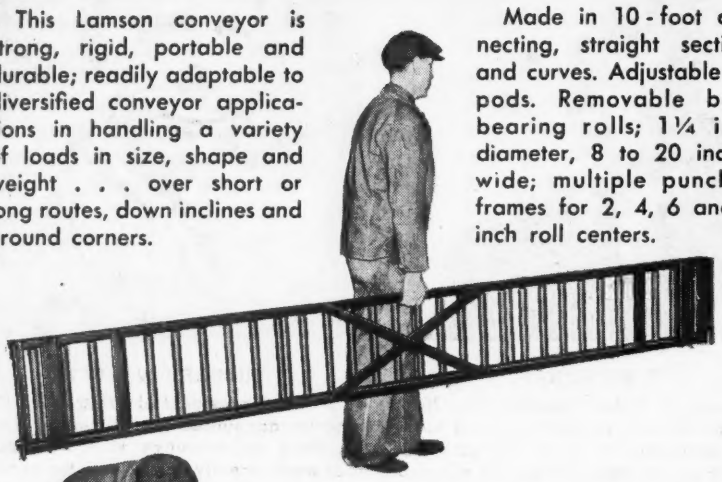
Betty H. Bahler, formerly in charge of oil analysis, Kraft Cheese Co., Chicago, is now associated with Truesdail Laboratories, Inc., Los Angeles. Ralph E. Christie, previously chief chemist for Union Sugar Co., Betteravia, Calif., is also with the Truesdail company.

Fred W. Cox, Jr., Maxine Brogden and Ann E Perryman have joined the research staff of Southern Research Institute, Birmingham, Ala.

T. G. Dyer has resigned as manager of the Northwest division of Russell-Miller Milling Co., Minneapolis, to become general manager and a

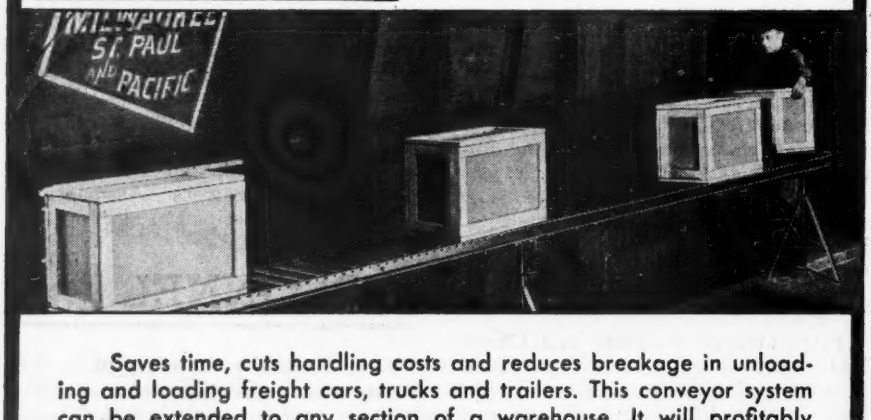
LAMSON Lightweight
PORTABLE GRAVITY CONVEYOR
Costs Less... Does More

This Lamson conveyor is strong, rigid, portable and durable; readily adaptable to diversified conveyor applications in handling a variety of loads in size, shape and weight . . . over short or long routes, down inclines and around corners.



Made in 10-foot connecting, straight sections and curves. Adjustable tripods. Removable ball-bearing rolls; 1¼ inch diameter, 8 to 20 inches wide; multiple punched frames for 2, 4, 6 and 8 inch roll centers.

Designed for fast, one-man set-up. Safely carries cleated boxes, fragile cartons, and those containing glass-packed products. Full length rolls facilitate the handling of top-heavy packages and restrain cartons from running off the sides. Live loads up to 46 pounds per foot are carried with a minimum of section deflection.



Saves time, cuts handling costs and reduces breakage in unloading and loading freight cars, trucks and trailers. This conveyor system can be extended to any section of a warehouse. It will profitably supplement any built-in conveyor system.

★ You will get the greatest measure of service from a Lamson Lightweight Portable Gravity Conveyor . . . and you will get a better value . . . a saving of up to 30% on the initial cost. WRITE TODAY for descriptive folder.

ARMY (E) NAVY

LAMSON CORPORATION
Makers of Conveyors and Pneumatic Dispatch Tubes
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partner of the Tanvilac Co., Des Moines, feed manufacturer.

John S. Goldsmith has been appointed manager of the Exmore, Va., plant of John H. Dulany and Son. He succeeds L. M. Jordan, who resigned after eight years as manager.

Dr. Frank L. Gunderson, executive secretary of the food and nutrition board of the National Research Council, has been elected vice-president of the new research and product development department of Pillsbury Mills, Minneapolis. He will continue to contribute occasional services to the food and nutrition board on a consulting basis.

T. J. Kullman has been made production manager of Bowman Dairy Co., Chicago. He was formerly general supervisor of the plant. In his new capacity, Mr. Kullman also will be responsible for production at the company's three new subsidiaries: Cleveland Ice Cream Co., Cleveland; Badger Ice Cream Co., Kenosha, Wis., and Progressive Dairy Co., Racine, Wis.

Don Richter is the new superintendent of the Great Lakes Sugar Co., Fremont, Ohio, beet processing firm. He succeeds B. J. Paschal, who was transferred recently to a similar post at the Findlay, Ohio, plant of the firm.

John A. Rodda, who resigned from the War Production Board after two and a half years' service as chief of the insecticides and fungicides unit, is now assistant manager in the insecticide department of Dodge and Olcott, Inc., New York.

H. A. Ruehe, formerly executive secretary of the American Butter Institute, Chicago, is returning to his position as professor of dairy manufactures at the University of Illinois. He has been on leave of absence from the University since Feb. 1, 1943. Russell Fifer succeeds Dr. Ruehe as executive secretary of the Institute.

Ray M. Schmitz has been elected vice-president of General Foods Corp. Formerly assistant to the executive vice-president, Mr. Schmitz will assume charge of the newly created corporate development department.

George E. Siebel has been elected president of Little and Co., Inc., Chicago, succeeding Francis J. Holland, who resigned to accept a position in a legal capacity with Ekco Products Co., Chicago.

P. E. Sprague, formerly vice-president in charge of sales for the Glidden Co., Cleveland, has been named vice-president in charge of administration of the soya products division, Chicago, and feed mill division, Indianapolis. W. J. O'Brien becomes chairman of the research and manufacturing committee of the company.

Resist THE ELEMENTS

Rely on National . . . with its long practiced, specialized skill . . . to provide a bond of high wet strength

With the thought in mind that you can't choose the weather — but you can choose the adhesive — let's take a look at the short but very complex life of an ordinary single-ply Kraft shopping bag: A sudden shower may drench it; an unexpected meeting with a wet surface may soak it; close contact with wet vegetables, frozen food and sweating bottles may saturate it. In each case the bond will fail almost immediately unless it is formed with a high wet strength adhesive.

Make a comparative submersion test against an ordinary bond. There's a sales point here that may surprise you!

Now, let's look at the more complex problem of shipping calcium chloride. Packaged at 205°F. it is so hygroscopic that moisture cakes it . . . so deliquescent that excessive moisture sends it into solution . . . yet it must be delivered dry and free flowing. A 5-ply multiwall bag solved the problem: Three plies of specification Kraft paper; two special moisture-resistant plies — all bonded with high wet strength adhesives.

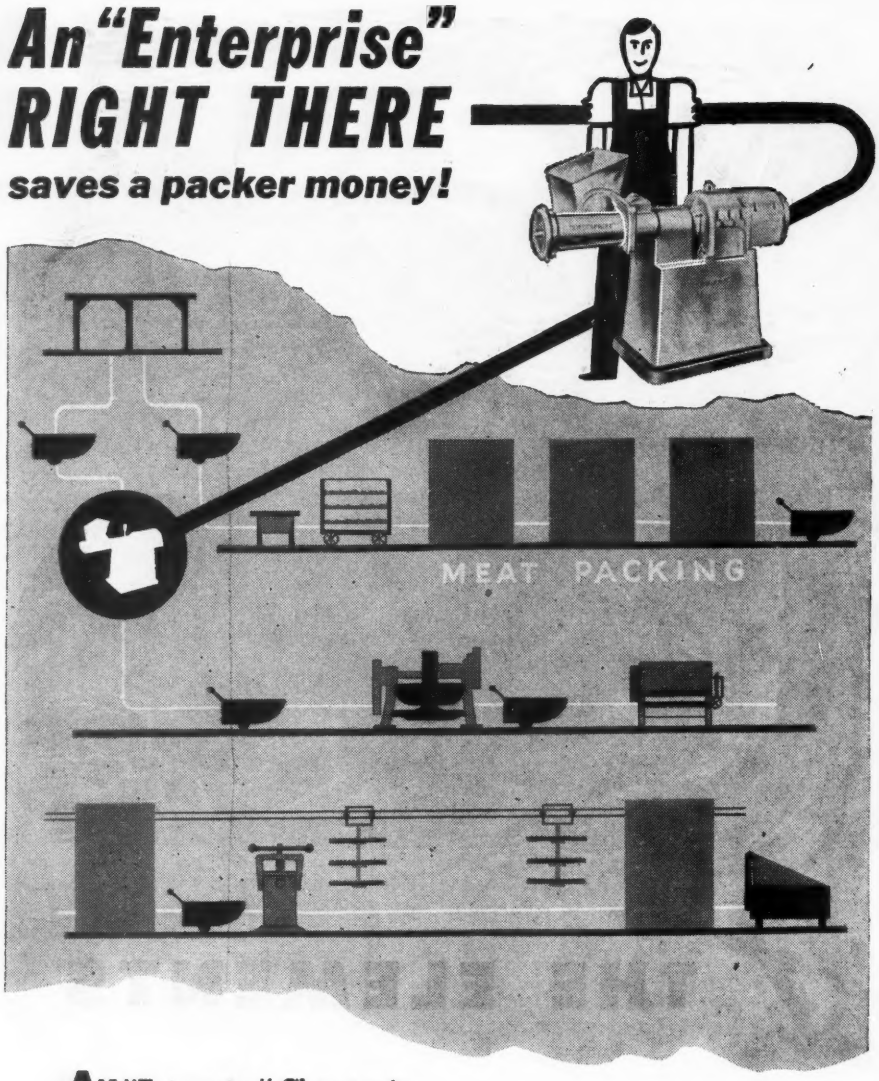
Wet strength adhesives offer a solution to packaging, converting, assembling problems involving resistance to water, moisture-vapor, oil, steam, grease, lactic acid, etc. Submit your specific problem to National . . . now!

Offices: 270 Madison Avenue, New York 16; 3641 So. Washtenaw Avenue, Chicago 32; 735 Battery Street, San Francisco 11, and other principal cities. In Canada: Meredith, Simmons & Co., Ltd., Toronto and Montreal. In England: National Adhesives Ltd., Slough, Bucks.

National ADHESIVES

EVERY TYPE OF ADHESIVE FOR EVERY TYPE OF ADHESION

An "Enterprise" RIGHT THERE saves a packer money!



AN "Enterprise" Chopper in the production line more than pays its way.

Our flow-chart shows where an "Enterprise" helps a packer get a better product at lower cost, thanks to the exclusive Enterprise system of cutting. Not only packers, though, but bakers, ice cream makers, canners, confectioners—any processors with a food-reducing operation—get with Enterprise a definitely improved product at a lower cost of operation and maintenance.

Food-reducing problems invited. Our experts, backed by more than 75 years' experience, are likely to come up with the one best answer.

The ENTERPRISE System of Cutting

It's exclusive! *It's superior!*

The ENTERPRISE MFG. CO. of PA.

PHILADELPHIA 33, PA.

78 YEARS' EXPERIENCE BEHIND THE MODERN "ENTERPRISE"

John I. Thompson and his associates have formed a partnership of consulting engineers to be known as John I. Thompson and Co., with offices in Washington, D. C. The firm will continue to place special emphasis on the food, drug, cosmetic and allied chemical and packaging fields.

E. E. Willkie, vice-president in charge of production of Libby, McNeil and Libby, has been in Europe to see what is left of Libby's evaporated milk business and its production plant at Leer, Germany.

DEATHS

Arthur Wesley Cushman, 64, formerly executive vice-president of Hygrade Food Products Corp., Chicago, July 16.

Allen P. Doron, 68, president and cofounder of Factory Stores, Cleveland, Ohio, August 10, in Chicago.

Frank B. Dunford, Sr., 78, for 41 years associated with Kingan and Co., Richmond, Va., August 4.

Otto Faber, 58, sugar machinery designer, Buffalo, N. Y., recently in Port Stanley, Ont.

Clarence C. George, refrigeration engineer for Virginia Food Products Co., Richmond, Va., August 8.

Edwart T. Griffiths, 69, office manager of Quaker Oats Co., Akron, Ohio, July 27.

Leonard B. Hall, 61, central division manager of American Can Co., recently, in Oak Park, Ill.

Curtis Holmes, 61, general superintendent of John P. Squire Co., Cambridge, Mass., August 11, in Boston.

Michael S. Huffman, 62, formerly a vice-president and director of Continental Can Co., July 18, at Washington, D. C.

Thomas Holmes Johnson, 65, formerly general manager of Canadian Fish and Cold Storage Co., and president of Canadian Fisheries Association, Prince Rupert, B. C., recently.

Jesse R. Jones, 68, secretary and treasurer of Philip H. Postel Milling Co., Mascoutah, Ill., July 14.

John H. Licht, 88, last surviving founder of the Patent Cereal Co., Geneva, N. Y., recently.

H. C. Merritt, Jr., 51, general manager of Taugus Ranch, Tulare, Calif., July 11.

William N. Roper, 73, expert in pecan culture in the State of Virginia, July 24, at Petersburg, Va.

Stanolube HD has all three to resist all engine deposits

1 CHOICE BASE STOCKS

2 SOLVENT REFINING

3 OUTSTANDING ADDITIVES
developed by our research chemists

NO STRAIGHT mineral oil, regardless of the refining method used, can equal the engine cleanliness and protection you get from Stanolube HD. No heavy duty oil available today has a better combination of these important oil qualities. (1) High oxidation stability (to resist varnish formation and ring sticking); (2) Good detergency (to keep deposit forming materials from sticking to engine parts); (3) Excellent corrosion resistance.

That's because no other oil is made from the same high grade crude, *plus* the same degree of refining, *plus the special additive* developed by Standard Oil. Engine tests prove that Stanolube HD is outstanding in the oil qualities that reduce fleet engine maintenance. Test these claims in your fleet of heavy-duty gasoline or Diesel powered equipment. A Standard Oil Automotive Engineer will help you.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

Stanolube HD

Buy more War Bonds

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ FLEET CONSERVATION SERVICE

Winthrop

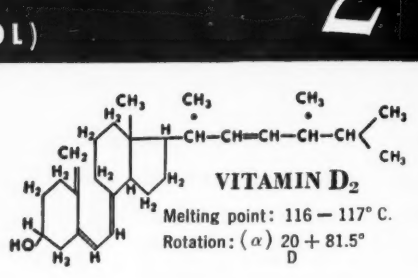
CHEMICAL COMPANY, INC.

Now Offers . . .

PURE CRYSTALLINE

Vitamin D_2

★ (CALCIFEROL)



VITAMIN D_2

Melting point: 116 — 117° C.

Rotation: $(\alpha)\ \frac{20}{D} + 81.5°$

Winthrop's synthetic vitamin D_2 (Calciferol) is free from lumisterol, toxisterol, suprasterol, and other by-products of irradiation. It never varies in antirachitic potency.

OTHER WINTHROP PURE SYNTHETIC VITAMINS:

- **TRIDEE**—Winthrop's Brand of vitamin D_3 in Corn Oil
- **VITAMIN B_1** (Thiamine Hydrochloride)
- **VITAMIN B_2** (Riboflavin)
- **NIACINAMIDE**
- **VITAMIN B_6** (Pyridoxine Hydrochloride)
- **CALCIUM PANTOTHENATE**
- **VITAMIN C** (Ascorbic Acid)
- **d-ISO-ASCORBIC ACID . . .**
- **AMINO-ACIDS:**
  Tryptophane
  Phenylalanine
  Methionine
- **"B-E-T-S"**—Winthrop's Brand of Bread-Enrichment Tablets
- **"VEXTRAM"**—Winthrop's Brand of Flour-Enrichment Mixture

POTENCIES AND PACKINGS:

Crystalline form in vials of one five, and ten grams.

Solution in Corn Oil: 1,000,000 U.S.P. Units per gram* packed as follows:

400 Standard Units	2,500 Standard Units
1,000 Standard Units	50,000 Standard Units

Also Solution in Corn Oil: 400,000 U.S.P. Units per gram packed as follows:

250 Standard Units	1,000 Standard Units
500 Standard Units	20,000 Standard Units

*Standard Unit=1,000,000 U. S. P. Units

WINTHROP

For prices and information address
Special Markets Division
WINTHROP CHEMICAL COMPANY, INC.
170 Varick Street, New York 13, N. Y.

★ Sole Manufacturer under U. S. Patent 1,902,785 granted to Winthrop Chemical Company, Inc.

ASSOCIATED INDUSTRIES

Atlas Powder Co. has received authorization to construct a new chemical manufacturing unit at Atlas Point Plant, Wilmington, Del. Estimated cost is placed at more than $1,000,000.

Byron Jackson Co., Los Angeles, Calif., pump manufacturer, has announced a $1,500,000 expansion program, including the construction of a new plant in Houston, Tex., and the acquisition of additional acreage adjoining the company's Los Angeles plants.

Certified Alloy Valve Co. has been formed as a new division of the Cooper Alloy Foundry Co., Hillside, N. J. The new company will specialize in the manufacture of stainless steel valves for which it will furnish a certified analysis of each part that comes in contact with liquid.

Clarvan Corporation, Milwaukee, has announced the appointment of C. F. Fuller as technical sales representative. Mr. Fuller has had more than 23 years' packaging experience, the last four having been devoted to work on wartime developments.

Continental Can Co., Inc., has completed plans for two new buildings to be added to its container plant at Van Wert, Ohio. The additions will consist of a factory building and a new research and engineering building.

Crown Can Co., Philadelphia, has made known the appointment of D. O. Merrill as assistant to the vice-president and director of sales. His headquarters will be at the home office in Philadelphia.

Fedders Manufacturing Co., Inc., Buffalo, has appointed Robert W. Morgan as chief engineer.

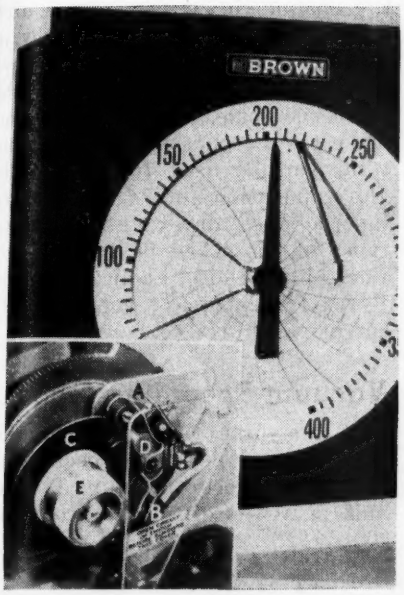
Glass Containers, Inc., a subsidiary of Fibreboard Products, Inc., San Francisco, soon will begin construction of a new glass container factory in Antioch, Calif.

Monsanto Chemical Co. plans to erect a modern plywood adhesives plant at Seattle. The new facility will combine operations of the company's I. F. Laucks, Inc., subsidiary plants in Seattle.

Ross and Rowe, Inc., Chicago, has announced the appointment of L. D. Witt to take charge of its bakery sales and service division. The company is the sole selling agent for the American Lecithin Co. in the United States and Canada.

St. Regis Paper Co. has opened a new sales office in Detroit, in charge of Carl E. Anderson.

FOOD EQUIPMENT NEWS



Emergency-alarm controller.

Alarm for Controllers

A NEW emergency-alarm feature has been added by Brown Instrument Co., 4536 Wayne Ave., Philadelphia, Pa., to its line of electronic air-operated controllers. The mechanism also provides "on"-"off" control, in addition to air control to actuate motorized valves, solenoid valves, contactor panels or signal lights.

As shown in the illustration, contacts *A* and *B* are made or broken by the action of cam *C* and roller *D*. The control point is set by loosening the knurled knob *B* and rotating cam *C* so that its notch corresponds to the position of the temperature pan that previously has been moved to the desired point. The pen position sounds the emergency alarm. A red pointer on the scale indicates the temperature setting of the contact controller.

High-Pressure Trap

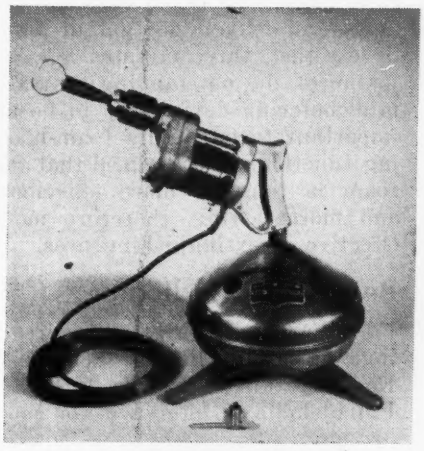
DESIGNED for pressures up to 600 lb. per square inch, or where all-steel fittings are desired, a new cast-steel, inverted-bucket steam trap with side inlet and outlet pipe connection is manufactured by Armstrong Machine Works, Three Rivers, Mich. It is available with ½-, ¾- or 1-in. screwed or flange connections, the flanges being welded into the trap body. Its height is 11¼ in.

The inverted bucket and valve lever are made of 18-8 stainless steel. Valve and seat are chrome steel, hardened, ground and lapped. The cap and interior mechanism can be removed without breaking the outlet or inlet connections.

Pipe-cleaning Tool

DESIGNED to house and drive 100 ft. of ½-in. flexible steel shafting with a cutting tool on the end, it will remove obstructions such as scale or slush in pipes, drains, tubing, sewer lines, steam risers, humidifiers, and so forth. That is a description of the pipe-cleaning tool made by Spartan Tool Co., 6007 Lincoln Ave., Chicago, Ill.

The flexible rod automatically coils and uncoils as it is fed into and from the container. The driving mechanism is a motor-driven head



Pipe-cleaning tool.

removable from the stand. In operation, this driving unit is held at the opening of the pipe or tube so that the desired length of flexible rod may be fed into the pipe. For removing waste material or scale, the flexible rod is equipped with an eliptically shaped, spring-steel, cutter head, as shown in the illustration. The normal speed of the cutter is 300 r.p.m.

The flexible shafting is said to operate the cutter regardless of the number of 90-deg. elbows or T's in the pipe line.

High-pressure Cleaner

INTENDED for cleaning equipment by means of high-velocity jets of hot or cold water at pressures ranging from 200 to 500 lb., a complete unit, is offered by A. B. Farquhar Co., York, Pa. It includes a high-pressure pump, and motor on either a portable or permanent skid.

Electronic Smoke Detector

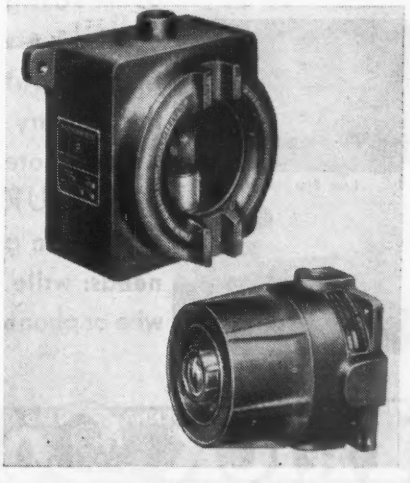
SMOKE in air conditioning systems is detected by a photoelectric unit announced by Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass. The instrument immediately sounds an alarm, turns off blowers, operates automatic dampers or provides whatever type of indication or control is required.

The system consists of a photoelectric control and a light source the latter projects a light beam 10 to 25 ft. to the photoelectric unit.

Sensitivity adjustment permits variation in the intensity of the light beam, and the unit may be set to respond to smoke of a predetermined density. To provide complete protection, either current or tube failure will cause the control to operate.

Both the light source and photocell are available in either explosion-proof or weatherproof housings. Operation is powered by 115-volt, 60-cycle current. Relay contacts are pure silver, designed to handle 10 amp. a.c. or 5 amp. d.c. A maximum of 230 volts may be applied to the contacts, providing 1,100 watts a.c. or 550 watts d.c. Heavy currents or high voltages can be controlled through an auxiliary power relay.

The system is designed to provide long service under severe operating conditions. It should require no adjustment or maintenance other than normal vacuum-tube and lamp replacement on a six-month schedule.

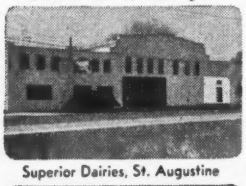


Photoelectric smoke detector.

Dairies Everywhere Like FRICK Refrigeration

Sheffield Farms, New York

Chestnut Farms, Washington



Superior Dairies, St. Augustine

Central Ice Cream, Chicago

Carnation Milk, Tulsa

Lone Star, Houston

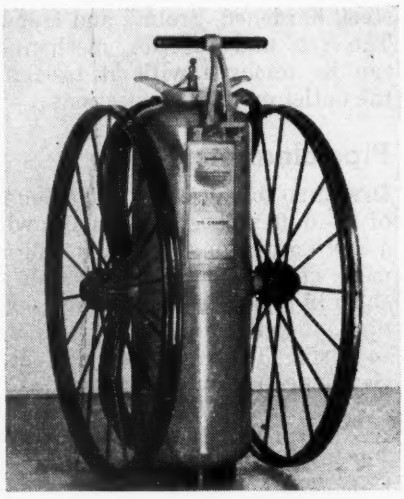
Adohr, Los Angeles

Because it sets the standards of dependability, convenience, and overall economy. Whether for cooling milk, freezing ice cream, keeping storage rooms cold, refrigerating trucks, making ice, or conditioning air, you'll find Frick equipment the choice of leading dairies throughout the country. Let us quote on YOUR cooling needs: write, wire or phone

WAYNESBORO, PENNA. U.S.A.
FRICK CO.
DEPENDABLE REFRIGERATION SINCE 1882

Oil-fire Extinguisher

EXTINGUISHING oil fires without danger of reflash is the function of the new Foamite Challenger 40-gal. extinguisher made by American-LaFrance-Foamite, of Elmira, N. Y.



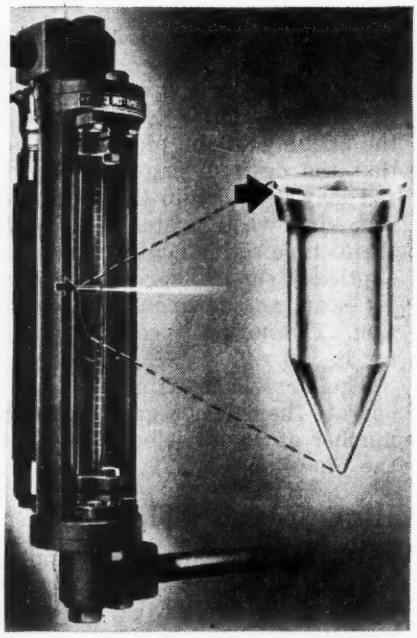
Oil-fire extinguisher.

It is said to produce 50 percent more foam than other 40-gal. foam units, and delivers 450 gal. of foam in less than three minutes.

One of the outstanding features is a metering device said to be an important factor in its foam-making function. It is claimed that the foam is tougher, more tenacious, and more lasting, therefore more effective in extinguishing fires.

Better Flow Indicator

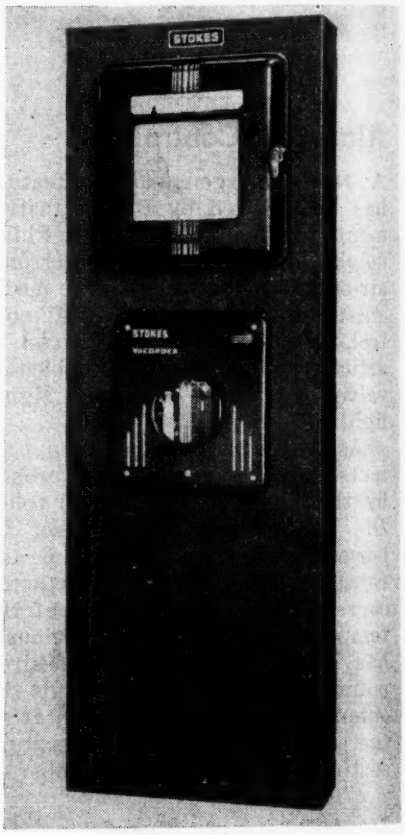
FOR sharp, clear Rotameter readings of opaque liquids, Schutte & Koerting Co., 1159 N. 12th St., Philadelphia 22, offers a rotor especially designed for the purpose. It has a disk of light-transmitting-material sandwiched into its head to substantially reduce the distance that the light must travel through the opaque liquid from its source behind the tube. Rate of flow is thus delineated sharply in the resultant band of light on the tube reference scale, and operators can make easy, accurate readings. This rotor can be used for practically any application and in any type of tapered-glass-tube Rotameter. Two types of disks can be furnished—Lucite for general applications and Pyrex for extremely hot or highly corrosive fluids.



Light transmitting rotor for Rotameter.

Vacuum Recording Gage

FOR the first time, McLeod-type indicating gages have been combined with a recording unit. This results in a recording gage producing



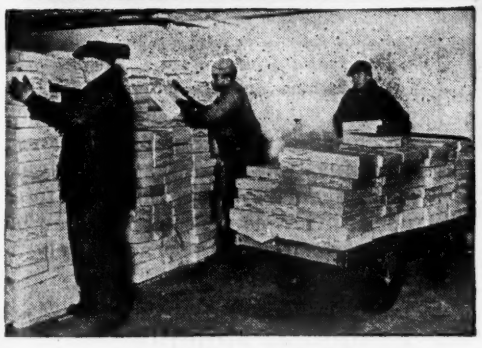
Vacuum recording gage.

a continuous, visible record of pressure conditions within a vacuum system between the limits of 1 and 5,000 microns of absolute pressure.

The unit consists of a modified Stokes high-vacuum gage, calibrated in microns, combined with a galvanometer-type recording unit. The gage is mechanically tilted from the horizontal (normal) position to the vertical (reading) position by an electric motor. The

HANDLING+Processing+HANDLING+Assembling+HANDLING+Packing+HANDLING+Storage+HANDLING

HANDLING—the Common Denominator of PRODUCTION



LET MEN DIRECT POWER—NOT GENERATE IT!

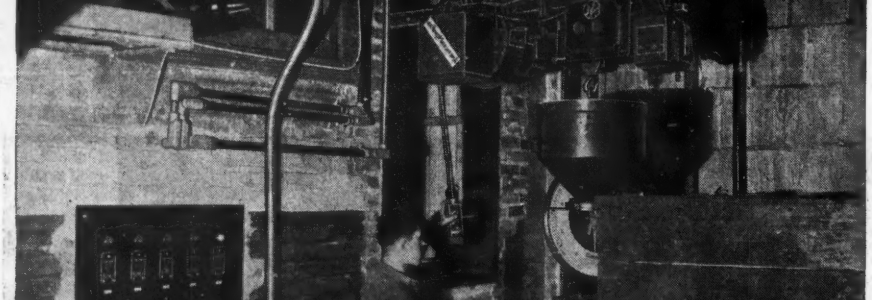
Handling small units is a problem. Whether they are handled individually, or are consolidated into single large loads determines, to a great extent, the cost of handling operations.

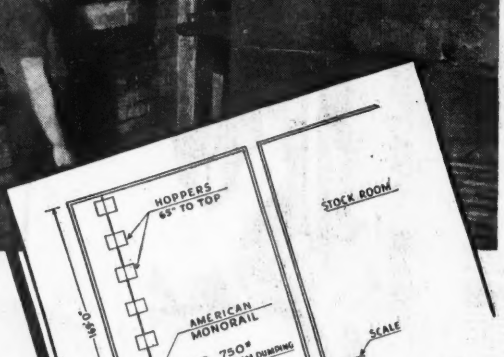
Versatile Towmotor, the modern materials handling system, eliminates hundreds of handling operations, saving time, money and manpower. You can effect similar savings on your operation—the Towmotor DATA FILE tells how. Write for your copy today.

TOWMOTOR

THE ONE-MAN-GANG

TOWMOTOR CORPORATION • 1222 E. 152ND STREET, CLEVELAND 10, OHIO

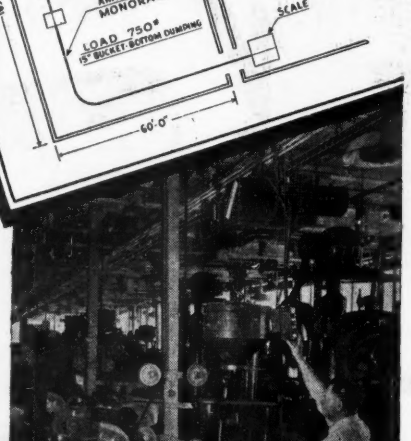


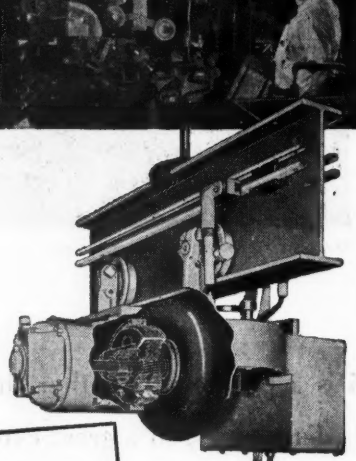


American MonoTractor *Automatically* FEEDS 15 STATIONS

Here is an American MonoRail System that is almost human. By remote control, semi-precious metal is delivered to fifteen tube - forming machines.

After dispatcher fills container with slugs he carefully check-weighs the load and dispatches it to one of the 15 machines. Operator at machine where carrier stops automatically unloads the metal slugs by push-button control and returns carrier to central station. All handling operations are performed through signal lights and push-button switches.





American MonoRail Systems are not all so complicated. But all do the handling job for which they are designed— better, quicker and at great saving in cost. An American MonoRail engineer will gladly tell you how it will work in your plant.

THE AMERICAN MONORAIL CO.

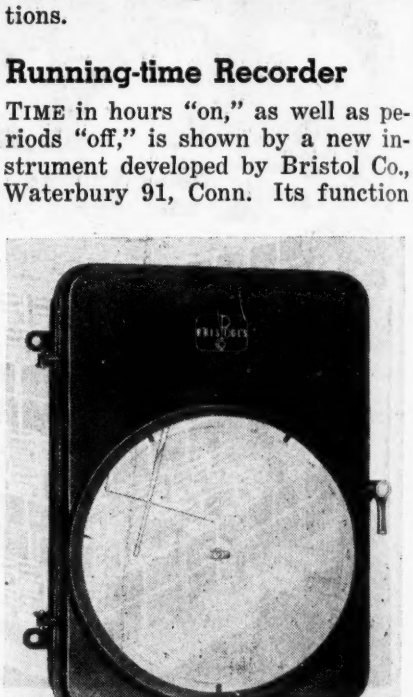
13125 ATHENS AVE. CLEVELAND, 7, OHIO

height of the measuring capillary, and hence the vacuum in the system, is electrically determined, this reading being automatically transmitted to the recorder.

E. J. Stokes Machine Co., Philadelphia 20, Pa., states that the instrument is designed for continuous service. It has a built-in chemical trap to exclude gases and all condensable vapors, including water, oils and alcohol. It is said to give accurate readings under all conditions.

Running-time Recorder

TIME in hours "on," as well as periods "off," is shown by a new instrument developed by Bristol Co., Waterbury 91, Conn. Its function



Machine running-time recorder.

is checking machine performance. Running-time readings are magnified in such a way that the total operating time of a machine can be determined easily and accurately to within a few seconds.

Insulating Material

PRODUCED by Monsanto Chemical Co., St. Louis 4, Mo., is a new insulant technically known as silica "aerogel." A handful of this material embraces millions of "dead air" pockets. It is prepared by drying a colloidal silica gel in such a way that a light fluffy structure of solid phase results. It differs from ordinary silica gels in that its void space is about 94 percent, whereas ordinary silica gel has a void space of only 30 to 50 percent. This gives the insulant extreme lightness. When used either in domestic or commercial freezing units, it is said to save floor space since it permits thinner walls than the conventional design.

CATALOGS, BULLETINS

FOOD PLANT EQUIPMENT

Rotary Dryers — General American Transportation Corp., 420 Lexington Ave., New York 17, announces Bulletin No. 53 (513a) an Steam-Tube Rotary Dryers. The bulletin is well illustrated with photographs and drawings of the equipment. It gives also some engineering data.

Centrifugal Pumps — Centrifugal pumps are described in a booklet published by Deming Co., Salem, Ohio. This bulletin contains basic information said to be applicable to all makes of centrifugal pumps. The 20-page booklet is profusely illustrated with photographs and sectional drawings showing the basic parts of centrifugal pumps.

Nonpulsating Pump—Ability to handle practically anything from free-flowing liquids to nonpourable pastes is claimed for a pump described and illustrated in a 16-page booklet issued by Robbins & Myers, Inc., Springfield, Ohio. The book explains how the rotor revolves within its stator to create ever-changing seal lines and shows why the pump is self-priming and has low internal turbulence and uniform discharge. Performance characteristics and a list of typical materials handled are included.

Generators, Compressors and Coolers—Turbine generators, steam-jet thermo-compressors, gas-engine refrigeration compressors, steam-engine refrigeration compressors, booster refrigeration compressors and evaporative coolers are covered in a series of bulletins issued by Worthington Pump & Machinery Corp., Harrison, N. J.

Process Kettles—Union Iron Works, Erie, Pa., describe, in a 4-page leaflet, a method of heating process kettles by means of built-in coils on the outside of a kettle. The unit is illustrated by drawings and photographs.

High Vacuum Pumps—A 4-page bulletin describing high-vacuum pumps with higher volumetric efficiencies and lower power requirements, as well as greater simplicity than the models they replace, has just been made available by the F. J. Stokes Machine Co., Olney P. O., Philadelphia 20.

Armored Rotameters—Catalog 43-E, dealing entirely with armored rotameters for measuring and controlling flow rates at high pressures and temperatures, has just been announced by the Fischer & Porter Co., 925537-0 County Line Rd., Hatboro, Pa. The catalog is generously illustrated with photographs of equipment, as well as sectional drawings of a number of units.

Horizontal Centrifugal Pumps—Yeomans Brothers Co., 1433 N. Dayton St., Chicago 22, has issued a bulletin describing their augmented line of horizontal centrifugal pumps. The previous range of 125 g.p.m. has been increased to 1000 g.p.m., and heads have been raised from 40 to 250 ft. This increase has been accomplished by the addition of nine new pumps to the line. Engineering information and specifications for the various pumps are given.

PLANT SUPPLIES

Corrosion-resistant Materials—Corrosion-resistant materials and equipment are described and illustrated in a 16-page bulletin issued by the U. S. Stoneware Co., Akron. One of the items described is a corrosion-resistant plastic material that can be used for lining equipment. Said to have an unusually wide range of application, it resembles natural rubber in feel, flexibility and appearance. This material is also made into a corrosive-resistant paint, which can be applied to metal, wood or glass surfaces. Also described and illustrated is mixing equipment of the jar mill type as well as of the drum tumbler type.

Electrical Supplies—Wagner Electric Corp., 6459 Plymouth Ave., St. Louis 14, has recently issued a 16 page booklet describing its entire line of electrical products. Motors, transformers, industrial brakes and controls, and many other items are included. The booklet is profusely illustrated.

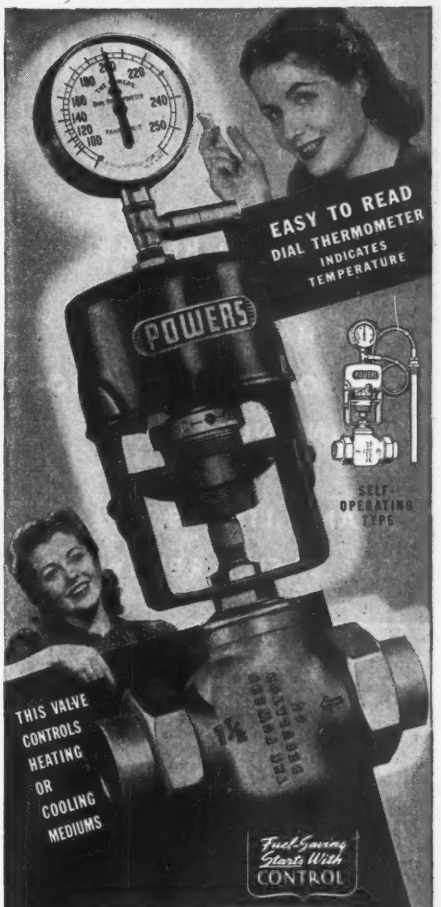
Paints—"What's Ahead in Paints" is the title of a 6-page brochure released by S. C. Johnson & Son, Inc., Racine, Wis. It is beautifully illustrated in color, briefly but dramatically presenting the story of wax-fortified paints.

Baker's Starch—National Starch Products, Inc., 270 Madison Ave., New York 16, has compiled a 32-page booklet on the use of starch in fruit pie and milk fillings. The effect of other ingredients on starch swelling and the handling and storage of cooked starches are discussed in detail. About half of the contents is devoted to formulas.

Adhesives—Adhesives and their properties are described in a 12-page booklet released by Minnesota Mining and Manufacturing Co., St. Paul 6. The booklet describes and illustrates adhesives and methods of application. Physical properties also are given.

Economize WITH POWERS

TEMPERATURE REGULATORS



Use a Powers No. 11 Temperature Indicating Regulator when you want the advantages of an easy-to-read dial thermometer combined with a dependable self-operating regulator. The dial thermometer gives a visual check on the performance of the regulator and makes it easy to adjust for the required operating temperature. Various dials and ranges are available.

Is Easy To Install—because both the thermometer and the regulator operate from the same thermal system—only one tapped opening is required.

Write for Circular 2511

THE POWERS REGULATOR CO.
27 Greenview Avenue, Chicago 14, Illinois
231 E. 46th St., New York 17, N. Y.—Offices In 47 Cities . . . See your phone directory.
70

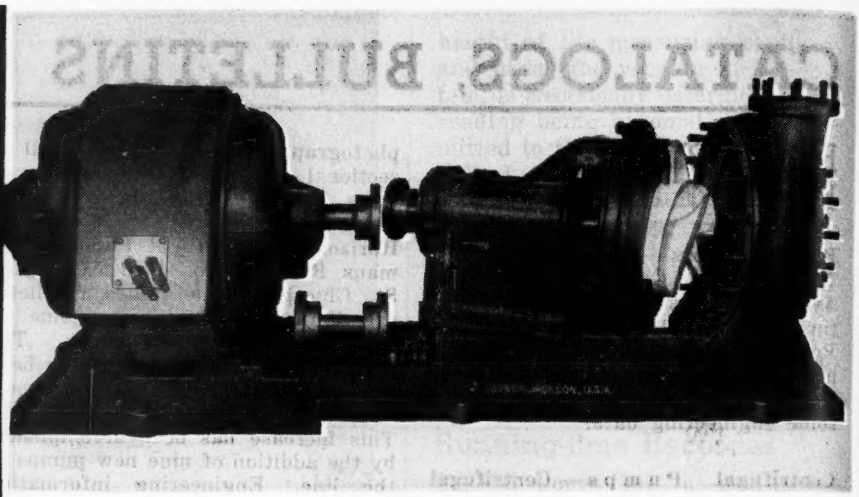
OVER 50 YEARS
OF AUTOMATIC TEMPERATURE AND HUMIDITY CONTROL

REDUCE YOUR
"Down Time"
by installing this
BYRON JACKSON
PULP PUMP

★ IT IS
HUSKY AND RELIABLE

★ IT HAS
NO TONGUE AND GROOVE
MOUNTINGS

★ AND LINERS
ARE EASILY RENEWABLE



This simple, rugged, easily dismantled pump is proving that the handling of fruit, grain and vegetable pulp, of both high and low consistency, can be accomplished with minimum "down time"—plant throughout can be increased and maintenance costs decreased.

An unusually large suction eye keeps velocities low, and the possibility of vapor binding is minimized.

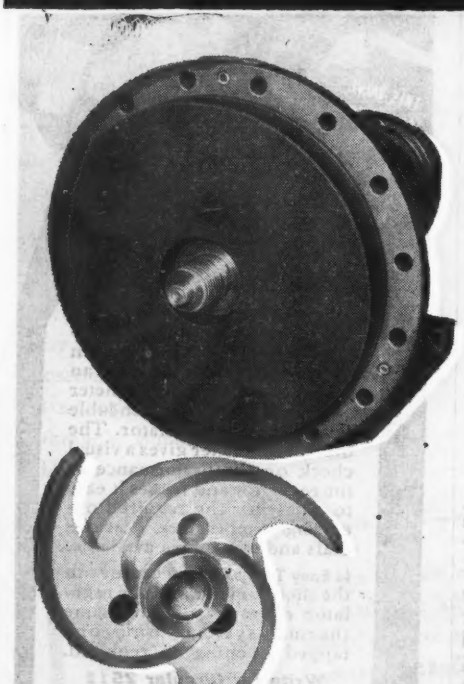
Complete bracket assembly with rotating element, pump cover and liners, can be removed as an assembled unit without disturbing the driver or the pump suction or discharge piping.

Renewable liners—of hardened iron or steel—securely bolted to the pump case covers—can be easily replaced, thereby eliminating the difficult-to-maintain tongue and groove mounting.

Impeller is of open type, mounted on an extra large heat treated shaft with coarse, self-tightening Acme threads.

Stocks with high acid or alkaline content or handled by special materials suited for the specific job.

Write today for further information.



Close-up of liner as bolted to pump case cover and detail of impeller mounted with self-tightening Acme threads.

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BOOKS

Postwar Technology

WARTIME TECHNOLOGICAL DEVELOPMENTS. Prepared under the direction of W. Duane Evans and the Bureau of Labor Statistics. 6⅞x9⅛ in.; 418 pages; paper. For sale by Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price, 25 cents.

This is a report on the possibilities offered by wartime technical developments in postwar manufacturing. Submitted to Congress by the subcommittee on war mobilization, it describes more than 1,400 technical advances, many of which the food engineer might use to advantage.

Biochemistry

ANNUAL REVIEW OF BIOCHEMISTRY. Edited by James Murray Luck and James H. C. Smith. Published by Annual Reviews, Inc., Stanford University, Calif., 1945. 6¼x9⅛ in.; 856 pages; cloth. Price, $5.

The 14th volume of this review continues the creditable task set by its predecessors. Its 29 papers make it the largest volume of the series, which will probably be the last published under limited wartime conditions.

Of the papers, all but six are of definite value to the food field, and it is highly probable that not even those six will be passed over by the food chemist.

Fats and Oils

INDUSTRIAL OIL AND FAT PRODUCTS. By Alton E. Bailey. Published by Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y., 1945. 6¼x9¼ in.; 735 pages; cloth. Price, $10.

There are prominent gaps in the literature of oil and fat technology, particularly in the edible field, which this volume attempts to fill. As a result, a great deal of technical material is here published for the first time on such materials as plastic shortening agents and bakery products, and on the practical processing operations of refining, bleaching, deodorization and hydrogenation.

This is not to say, however, that the text has not been based upon the previous literature. But the author does claim that all the material, both old and new, has been treated critically. A major portion of the book is devoted to a description of commercially important oil and fat products and the processes by which these products are derived from crude fats and oils. Some early space is also given to a brief review of the chemical and physical nature of fats and oils and to the composition, characteristics and availability of the various fatty raw materials.

The book is fully illustrated with charts, tables and graphs, showing worldwide production and consumption of the oils under discussion, as well as their composition and characteristics under various conditions.

Cheese Making

PRACTICAL CHEDDAR CHEESE MANUFACTURE, 3rd EDITION. By G. H. Wilster. Published by Oregon State College Cooperative Assn., Corvallis, Ore., July, 1945. 6½x9 in.; 273 pages; paper. Price, $3.

Although identified as a manual for cheese makers, this second revision of the first edition, published in 1942, is such a completely rewritten and amplified version that it has reference value and is useful as a text-book on cheese manufacture.

Its contents are based on the author's knowledge of and experience in commercial cheese manufacture, information obtained from manufacturers of milk processing equipment, and results of research in various parts of the world. It is intended to be of special help to apprentice cheese makers desiring to prepare themselves for obtaining state cheese makers' licenses.

Particular attention is given to the production and procurement of milk for cheese making and to its pasteurization and handling preparatory to conversion into cheese. The economics of cheese making, control over quality, grading and ultimate use of cheddar cheese are included. The statistical data, which was a helpful section in the second edition published in 1944, has been fully revised and brought up to date.

A loose plastic binding permits the book to open flat and the contents of the pages to be read and instructions followed by a cheese-plant worker while both of his hands are engaged in production operations.

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GOVERNMENT PUBLICATIONS

UNITED STATES IMPORTS FROM CHINA. United States Tariff Commission. Mimeographed. Free from Commission. An analysis of the Prewar Trade between the United States and China.

FISHERY STATISTICS OF THE UNITED STATES, 1941. By R. H. Fiedler. Fish and Wildlife Service, Statistical Digest No. 7. Available from Superintendent of Documents, Washington 25, D. C. Price, 25 cents.

TRADE PRACTICE RULES FOR THE LOW-PRESSURE REFRIGERANTS INDUSTRY, as promulgated June 30, 1945. Federal Trade Commission. Mimeographed. Free from Commission.

POST-WAR IMPORTS AND DOMESTIC PRODUCTION OF MAJOR COMMODITIES. A Report of the United States Tariff Commission in Response to Senate Resolution No. 341 (78th Congress). Senate Document No. 38. Available from Superintendent of Documents, Washington 25, D. C. Price, $1.75.

CONTROLLING INSECTS IN FLOUR MILLS. By R. T. Cotton, J. C. Frankenfeld and G. A. Dean. Department of Agriculture, Circular No. 720. Available from Superintendent of Documents, Washington 25, D. C. Price, 15 cents.

HOW TO STOW AND TAKE CARE OF FOOD ON SHIPBOARD. War Shipping Administration. Available from Superintendent of Documents, Washington 25, D. C. Price, 50 cents.

GUARANTEED-EMPLOYMENT AND ANNUAL-WAGE PROVISIONS IN UNION AGREEMENTS. Bureau of Labor Statistics, Bulletin No. 828. Available from Superintendent of Documents, Washington 25, D. C. Price, 10 cents.

REDUCING DAMAGE TO EGGS AND EGG CASES. By O. F. Johndrew. Office of Marketing Services, Miscellaneous Publication 564. Available from Superintendent of Documents, Washington 25, D. C. Price, 10 cents.

FOREIGN TRADE STATISTICS. Commerce Department statistical statements are now available on all commodities as to imports and exports through the calendar year 1942 and for most commodities for trade in 1943 and 1944. Requests to the Bureau of the Census should specify commodities and times for which data are wanted.

A POST-WAR FOREIGN TRADE PROGRAM FOR UNITED STATES AGRICULTURE. Department of Agriculture, AIS-15. Available on request to the Office of Information, United States Department of Agriculture, Washington 25, D. C.

PATENTS

BAKING

Bars Iced in Continuous Manner During Passage Through Icing Bath on Traveling Carrier and Over Rotating Roller Which Removes Excess Coating Material From Lower Edges of Bars—Rudolph C. Lang, to National Biscuit Co., New York, N. Y. No. 2,381,502. Aug. 7, 1945.

Dough Mechanically Dispensed From Vertical Hopper With Forming Discharge Opening at Bottom—Edmund T. Ersepke, San Francisco, Calif. No. 2,379,956. July 10, 1945.

Pies and Similar Circular Food Units Trimmed by Mechanical Means—Frank Bryant, to Bradley Pie Co., Los Angeles, Calif. No. 2,381,644.

BEVERAGES

Artificial Coffee Beans Made From Roasted Coffee Extract, Potassium Acid Phosphate and Corn Sirup by Concentration, Compression, Light Roasting and Glazing—Mark Weisberg, Providence, R. I., to Bellefont Associates, Cranston, R. I. No. 2,380,092. July 10, 1945.

Ground Coffee Extracted With Corn-sirup Solution and Dehydrated to Give Coffee-corn-sirup Mix—Walter R. Fetzer, Clayton, Mo., to Union Starch & Refining Co., Columbus, Ind. No. 2,379,427. July 3, 1945.

CANNING

Peaches Pitted In Continuous Manner by Mechanical Means—Percy Jepson, Oakland, Calif., to Pacific Machinery Co., San Francisco, Calif. No. 2,380,530. July 31, 1945.

Skin and Other Unwanted Substances Removed From Peas, Corn and Similar Vegetables by Combination Mechanical and Flotation Action During Transfer by Fluming—Walter S. Boynton, Portland, Me. No. 2,380,498. July 31, 1945.

CEREALS

Bulk Grain Treated With Ethylene Gas During Filling of Storage Bin to Prevent Harmful Increase in Temperature of Grain During Subsequent Storage—Arnold K. Balls, Washington, D. C., and Walter S. Hale, Alexandria Va., to Secretary of Agriculture of U. S. A. No. 2,381,421. Aug. 7, 1945.

Grain Treated and Milled To Produce Aseptically Clean Meal—Voldemar Borsakovsky, Saint-Julien par Sennecey le Grand, France, to Alien Property Custodian. No. 2,379,677. July 3, 1945.

DAIRY

Homogenized Milk Fortified With Both Carotene and Vitamin C to Obtain Sufficiently Deep Golden Color to Protect Vitamin C Content Against Catalytic Action of Light—Paul D. V. Manning, Chicago, Ill., and Elmer Trone, San Francisco, Calif., to Golden State Co., Ltd., San Francisco, Calif. No. 2,379,586. July 3, 1945.

Milk Containing Added Sugar Concentrated at Temperature Above 100 Deg. F. Under Partial Vacuum, Cooled by Evaporation With Vigorous Agitation To Temperature Between 70 Deg. F. (12.0 Mm. of Mercury) and 95 Deg. F. (33 Mm. of Mercury)—Paul T. Lemmel, Madison, Wis., and Hugh P. Fell, New York, N. Y., to Borden Co., New York, N. Y. No. 2,381,761. Aug. 7, 1945.

DEHYDRATION

Citrus Fruit Juices Dehydrated by Sublimation — Earl W. Flosdorf, Upper Darby, Pa., to Lyophile-Cryochem Co., Philadelphia, Pa. No. 2,380,036. July 10, 1945.

Cooked Mashed Potatoes Prepared in Powdered and Readily Reconstitutable Form With Substantial Retention of Cells Containing Starch Granules—Theodore Rendle, to Chivers & Sons, Ltd. Histon, England. No. 2,381,838. Aug. 7, 1945.

FATS AND OILS

Animal and Vegetable Oils Processed to Increase Their Iodine Value—Loran Old Buxton, East Orange, N. J., to National Oil Products Co., Harrison, N. J. No. 2,380,413. July 31, 1945.

Fat-soluble Vitamin Ester Concentrate Obtained From Fish Oil by Saponification and Extraction—Loran O. Buxton, Newark, N. J., to National Oil Products Co., Harrison, N. J. No. 2,380,410. July 31, 1945.

Fish Oils Treated to Produce Vitamin Concentrates Rich in Vitamin Esters and in Vitamin Alcohols—Loran O. Buxton, Newark, N. J., to National Oil Products Co., Harrison, N. J. No. 2,380,409. July 31, 1945.

Improved Fat-soluble Vitamin Concentrate Produced From Fish Oils—Loran Old Buxton, East Orange, N. J., to National Oil Products Co., Harrison, N. J. No. 2,380,414. July 31, 1945.

MEAT, FISH, POULTRY

Frankfurters and Similar Link-type Sausages Mechanically Banded With Identifying Continuous Paper Strip—Oscar E. Seiferth, Chicago, and Edward C. Sloan, Geneva, Ill., to Oscar Mayer & Co., Inc., Chicago, Ill. No. 2,379,935. July 10, 1945.

Meat Animal Carcasses Chilled to Remove Animal Heat, Cut Into Wholesale Cuts, Wrapped in Labeled Moistened Glassine to Obtain Skin-tight Contact With Cut Surfaces and Finally Wrapped With Brine-moistened Cloth—Beverly E. Williams, to Industrial Patents Corp., Chicago, Ill. No. 2,379,845. July 3, 1945.

Eggs Graded by Mechanical Means—John Stewart Campbell and William Brown, Melbourne, and George Alexander Douglas, Mount Brydges, Ontario, Canada. No. 2,381,035. Aug. 7, 1945.

Poultry Handled Through Eviscerating and Dressing Operations in Mechanically Controlled Continuous Manner—Chester B. Franz, Brentwood, Mo., one-half to Barker Poultry Equipment Co. No. 2,381,044. Aug. 7, 1945.

Crab Meat Prepared for Packaging and Heat Processing by Treatment With Acid Solution With pH 4.7 to 5.2—Henry F. Webb, St. Louis, Mo. No. 2,381,019. Aug. 7, 1945.

Fish Mechanically Skinned While Passing Over Rotating Refrigerated Drum and Under Positioned Knife—J. Donald Hendrickson, Astoria, Ore., to Columbia River Packers Assoc., Inc., Astoria, Ore. No. 2,380,755. July 31, 1945.

PACKAGING

Candy Packaged in Cylindrical Container Mechanically Formed From Sheet Material and Made To Have Overlapping Edge Portion—Elvin Dennis Angell, to Overland Candy Corp., Chicago, Ill. No. 2,379,407. July 3, 1945.

Foods Preserved in Flexible-walled, Fluid-tight Bags — Harry F. Waters, New York, N. Y. No. 2,380,134. July 10, 1945.

MISCELLANEOUS

Concentrated Glycerin Solution Freed From Fermentation Residue — Howard E. Hoyt, Stamford, Conn., to U. S. Industrial Chemicals, Inc., New York, N. Y. No. 2,381,055. Aug. 7, 1945.

Protein Containing Tyrosine Treated With Iodine To Make Synthetic Thyroprotein—Charles W. Turner and Ezra P. Reineke, Columbia, Mo., to American Dairies, Inc., Kansas City, Mo., and Quaker Oats Co., Chicago, Ill. No. 2,379,842. July 3, 1945.

TELL US MORE
Teacher!

● Maybe you're like a lot of food technologists and salt buyers who have gone along thinking all salt is the same. Actually, of course, various brands and grades and grains of salt differ in many respects.

Take solubility: In salting cheese, slow solubility is highly important and desirable. Otherwise, salt is lost in the whey, producing flat, under-salted cheese. On the other hand, in salting butter, salt must dissolve with lightning speed. If the butterfat is on the soft side—lacking in body—at certain seasons, butter salt must dissolve so quickly that over-working is avoided. Otherwise, the butter may lose its desirable physical properties and become mottled or marbled—and may lose its moisture, become leaky. Yet, if the salt is not properly dissolved, the butter may be gritty.

To meet these problems, we have set up definite solubility standards for Diamond Crystal Salt. Our Butter Salt, for example, dissolves completely in water at 65° F. in less than 9.8 seconds—average rate, 9.2 seconds. That is why so many quality-minded food processors have learned to depend on Diamond Crystal products, manufactured under strict quality-control standards for solubility rate.

Want Free Information On Salt? Write Us!

If salt solubility enters into your processing, write to our Technical Director. He will gladly recommend the correct Diamond Crystal Salt for best results. Diamond Crystal, Dept. J-12, St. Clair, Michigan.

DIAMOND CRYSTAL
ALBERGER PROCESS **SALT**

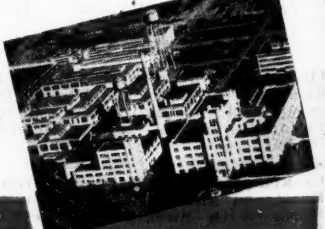
To retard *browning* and *loss of flavor* upon thawing—two of the major problems which must be conquered if frozen peaches and apricots are to satisfy housewives, bakers and the ice cream industry—many more processors are using ascorbic acid (vitamin C) for the first time in prefreezing treatment of their 1945 pack.

Hoffmann-La Roche first supplied ascorbic acid for this purpose several years ago. But war brought unprecedented demand for vitamin C for military and Lend-Lease purposes. Only when WPB restrictions were lifted in December, 1944, did ascorbic acid become available for wide scale use as an antioxidant.

From the days of earliest research on vitamin C the name Hoffmann-La Roche has been associated with ascorbic acid. Today the pharmaceutical chemical industry looks to Hoffmann-La Roche for its production "by the tons." We have felt privileged to supply a major portion of the frozen fruit industry's 1945 ascorbic acid requirements and to have our technical experts in your plants.

* * *

Commercial processors desiring technical information and costs are invited to write to our Vitamin Division.



Vitamin Division, HOFFMANN-LA ROCHE, Inc., Nutley 10, N. J.

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

BAKING

Egg White for Baking

WHEN egg whites are concentrated at a moderate temperature, down to a solids content of 25 to 60 percent, but not to dryness, deleterious changes in the protein are avoided and the product reconstitutes to give whipping and cake baking properties substantially the same as the untreated egg whites, according to recipients of a recently issued patent.

It is reported that the concentrated product may be stored at refrigerator temperatures or held frozen for an indefinite period. Addition of 30 to 40 percent of sugar permits storage at room temperature.

Evaporation at 130 to 140 deg. F. on trays in a tunnel dryer is followed by a holding period of 12 to 14 hours at 45 to 50 deg. F. to equalize moisture, before final storage.

Digest of U. S. Patent 2,377,644, issued June 5, 1945, on an application dated Sept. 1, 1941, to C. H. Parsons and L. D. Mink, and assigned to Industrial Patents Corp.

How Soya Acts in Bread

THERMOPHILE limitation to not over 50 per gram should be added to the specifications of the Food Distribution Administration, Grain Products Branch, to insure a soya flour satisfactory for inclusion in yeast-raised goods. Of five commercial soya flours tested for rope spores, three had counts over 200, one showed 20 and the other only 2 spores per gram.

Other factors reported included color, which is affected by even 5 percent of bleached soya flour in the wheat flour. Bleaching with an agent containing benzoyl peroxide improved the baking properties of the wheat-soya mixtures.

There is not much effect on dough absorption up to 5 percent soya flour.

Small amounts have no adverse effect on a farinogram, but when 20 parts of soya flour is used, dough development time and dough stability range are shortened and the breakdown on long working is increased.

With 3 percent soya flour, no change in the amount of yeast food is necessary. There is no effect on gas production with diastated flour up to that percentage, and only slight increase above that. Oxidizing agents improve dough properties when soya flour is present. The effect of the soya flour on gluten protein is similar to that of glutathione.

Digest from "Functional Properties of Soya Flour as a Bread Ingredient," by R. T. Bohn and H. H. Favor, *Cereal Chemistry*, vol. 22, 296-310, July, 1945.

QUALITY CONTROL

Inaccuracies in Assays

SYSTEMATIC discrepancies of the order of 30 to 44 percent in determination of vitamin A through the use of U.S.P. reference cod liver oil No. 2 are demonstrated, by both bioassay and spectrophotometric data. Indications are clear that this reference material contains less than 1,700 International Units of vitamin A, and that its potency varies, due to the instability of the vitamin in the oil.

Pure β-carotene is recommended as a standard until a more stable and satisfactory standard is developed.

The high values obtained through use of U.S.P. reference oil No. 2 may account for some of the inconsistent results reported in the literature.

Digest from "Standards in Vitamin A Assays," by E. C. Callison and E. Orent-Keiles, *Industrial and Engineering Chemistry, Analytical Edition*, vol. 17, 378-79, June, 1945.

RESEARCH METHODS

Colloid Investigation

STARCH JELLIES, among other colloidal systems, may be studied as they react to chemical or physical changes, by means of the Ultropak microscope.

This instrument has its lens system arranged so that the specimen is illuminated from above, with the light falling evenly from all points of an annular lens. The light passes down through an outer tube of the microscope, fitted with mirrors and focusing lenses. It then is reflected back through the magnifying lens system to the eyepiece. That is, the illumination system is independent of the viewing system, permitting individual control for focusing.

The Ultropak is not new, but its usefulness in this field was suggested by studies with the electron microscope. Because it uses white light, resolving power is not as great as in the electron instrument, but it avoids some of its disadvantages. Among other things, the ultramicroscope is much less expensive and the operating technic is less involved.

The authors consider the technic so promising that they have presented a brief preliminary report, illustrated with photomicrographs of various elastomers.

Digest from "Microscopic Studies of Lyogels, Ultra-Illumination by Incident Light," by E. A. Hauser and D. S. LeBeau, *Industrial and Engineering Chemistry*, vol. 37, 786-89, August, 1945.

FREEZING

Sirup Freezing

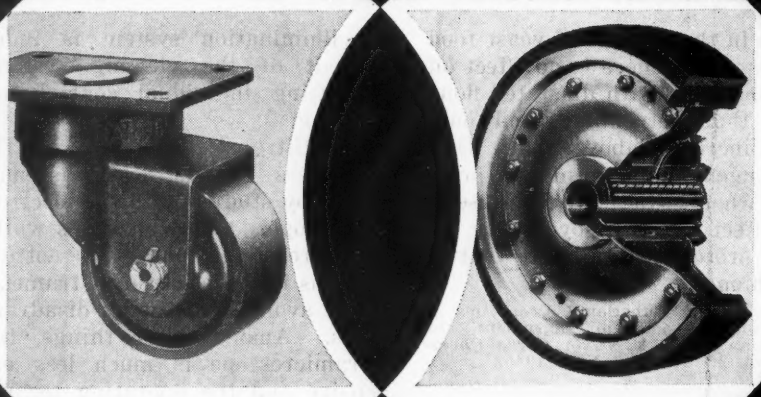
CONTINUOUS freezing of fruit, preferably in two stages, by means of flowing sheets of low-temperature sirup, is described in a patent issued recently. The patent covers both the apparatus and the method.

Several improvements over other brine or sirup freezing systems are claimed.

The fruit to be frozen is carried on a belt under continuous streams of the freezing sirup. Sirup is recirculated from a sump beneath the belt into a tank from which it flows by gravity over cooling coils and the spreader plates, then at high velocity over the surface of the fruit.

The patentee points out that the use of sheets or streams of liquid eliminates the need for spray nozzles in the liquid circulating system. Spray nozzles are subject to stoppage through entrained particles and are particularly unsatisfactory for use with sugar sirups because of the viscosity of these at low temperatures. In the patented system, the freezing medium, preferably a commercial invert sugar sirup containing levulose and dextrose, is recirculated without the need for extremely careful filtra-

A SAVING AT EVERY TURN



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tion. Power required for pumping is reduced to a minimum, also.

To promote the absorption of sirup and the thiosulphate or ascorbic acid that may be added to it to prevent browning, a preliminary cooling is provided for in the patent. The sirup, at a temperature higher than that of the final freezing medium but close to the freezing point of the fruit, is allowed to flow by gravity over the fruit on the belt.

A special conveyor may be substituted for the mesh belt, so that the fruit is turned over continuously as it is moved beneath the freezing liquid, providing still better contact with the medium.

Digest from U. S. Patent 2,372,373, issued March 27, 1945, on an application filed September 20, 1940, to J. L. Gilson, Hartsdale, N. Y.

ENGINEERING

Rapid Evaporator For Apple Aroma

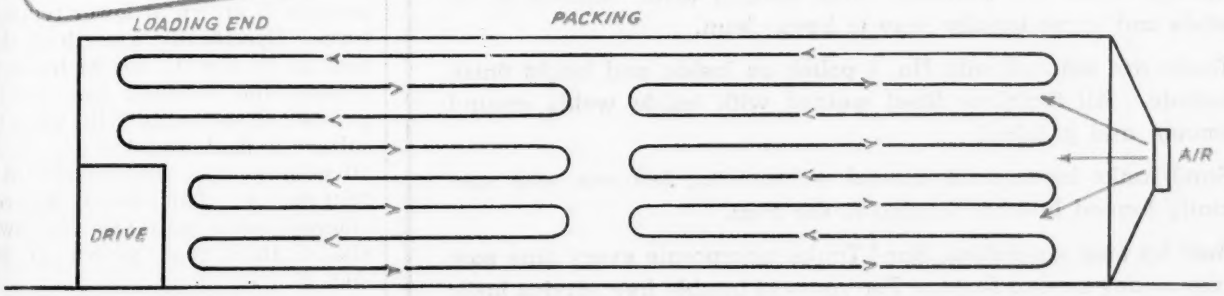
SUBSTITUTION of a single passage through a rapid evaporator for the step of flash vaporization from 320 deg. F., in the recovery of concentrated apple aroma, reduces the steam pressure requirement from 120 to 30 lbs. per square inch (gage) and avoids difficulties with fouling of the tubes. The fresh flavor of the aroma concentrate is not altered by the change.

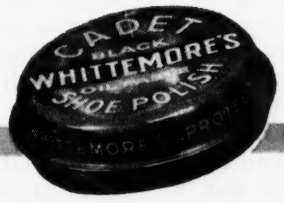
Pilot-plant experience with an evaporator having a 16½-ft. heated length of 0.62-in. inside-diameter tube, operated at 30-lb. steam pressure in the chest, indicated that a total heating time of 15 seconds did not modify the fresh flavor. Throughput was 50 gal. per hour.

Under certain conditions, as for example when the maximum steam pressure available is much below 30-lb. per square inch, it may be desirable to employ a high-velocity preheater. But when a preheater with a tube of 0.18-in. inside diameter was used ahead of the evaporator, the total permissible heating time without modification of fresh flavor was only 10 seconds, the time for preheating the juice to its boiling point being 2.0 seconds.

On unfiltered juice from fully ripe McIntosh and Stayman Winesap apples, representing the most unfavorable conditions that would be encountered in practice, with respect to fouling, the deposit on the tubes is so slight that daily cleaning probably would be sufficient. It is reported that the fouling deposit formed in a 3-hour run

Greer Multi-Tier Conveyor SAVES FLOOR SPACE for Whittemore Shoe Polish





Famous Whittemore Polish—Saddle Soap, too—is today being used in large quantities by the Armed Services. Space-saving Greer Multi-Tier Conveyors have increased production in this Cambridge plant, to the point where polish and soap are now also available for civilian needs. In installations such as this, where the products must pass through a cold room, the compactness of the Greer machine makes it possible to cut down the refrigeration to a very economical minimum.

Even more important, the unique construction of the Greer Multi-Tier results in great space-saving. In the Whittemore plant, Greer Conveyors give six times more cooling travel than straight-line processing would permit in the same floor space. Storage for cooling is unnecessary, and where multiple deposit is required, the Conveyor brings the containers back to the filling station automatically.

Highly efficient Greer Multi-Tier Conveyors are today continuously processing candy, cookies, bread, fruit bars, floor wax, and rubber compound, as well as shoe polish and saddle soap. Demand points to a further widening of the application of the Greer Multi-Tier Principle after the War. If you are short on floor space or you are planning a new plant, write at once for free Booklet F-9 giving complete information on the Greer Multi-Tier Conveyor.—

J. W. Greer Company,
119 Windsor Street,
Cambridge 39, Mass.

MAKERS OF FAMOUS **GREER** MULTI-TIER CONVEYORS

STAINLESS STEEL STORAGE and PROCESSING TANKS

INCREASE PRODUCTION and EFFICIENCY IN YOUR PLANT WITH THESE SPECIALIZED TANKS

Metal-Glass San-I-Tanks give you safe, clean and rapid handling of any chemicals or liquids. These modern tanks are constructed throughout of 18-8 Stainless Steel making them immune to all acids and exceptionally easy to keep clean.

Tanks are finished with No. 4 polish on inside and bright finish outside. All Stainless Steel welded with inside welds ground smooth and polished.

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Built by tank specialists, San-I-Tanks incorporate every time saving, money saving feature. For years of trouble free service insist on San-I-Tanks.

MANY SIZES IN STOCK — READY FOR IMMEDIATE SHIPMENT

We endeavor to have a supply of stock sizes in San-I-Tanks on hand at all times. We have a tank for every application and in any size you need. Write us giving complete data on the size tank you need and we will, in many cases, have the tank in stock.

LET OUR ENGINEERS SOLVE YOUR SPECIAL TANK PROBLEMS

In addition to our complete line of stock sizes in San-I-Tanks which are stocked for immediate shipment, we also manufacture special sizes built to your requirements. If you have a special tank problem get in touch with us and our engineers will be glad to give you their suggestions. No obligation of course. It it's a tank problem we can solve it for you. Over 20 years of tank building experience backs the San-I-Tank so play safe and work with a tank specialist.

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can be removed from the tubes o both the preheater and the evapo rator by shutting off the steam pumping cold water through th heating tubes, then stopping th pumps and suddenly admittin steam to the steam chest. The boil ing that takes place inside th tubes shortly thereafter remove the deposit.

(The original method for produc ing apple aroma concentrate 'wa given in FOOD INDUSTRIES for Feb ruary, 1945, page 164.)

Digest from "Supplement to Circula AIC-63," Agricultural Research Adminis tration, April, 1945. (Mimeographed.)

DAIRY

Swiss Cheese Starters

ABILITY to lower pH after heating is increased when *Lactobacillus bulgaricus* is grown at lower temperatures. Specifically, growth on skim milk at 76 deg. F. for 84 hours increases the activity, but not the number of surviving cells, when the culture is heated at 145 deg. F. for 30 minutes and then incubated at 98.9 deg. F. This starter was considered more suitable for Swiss cheese than that grown at 98.9 deg. F.

On the other hand, *Streptococcus thermophilus* suffered a decrease in ability to grow and produce acid after heat shock when initially grown at low temperatures. For this organism, when cultures grown at 86 to 98 deg. F. were subjected to 145 deg. F. for 30 minutes, a marked increase of rate of growth occurred.

Digest of "Influence of Incubation at Low Temperatures on Heat Resistance of Swiss Cheese Starter Cultures," by J. G. Voss and W. C. Frazier, *Journal of Dairy Science*, vol. 28, 545-53, July, 1945.

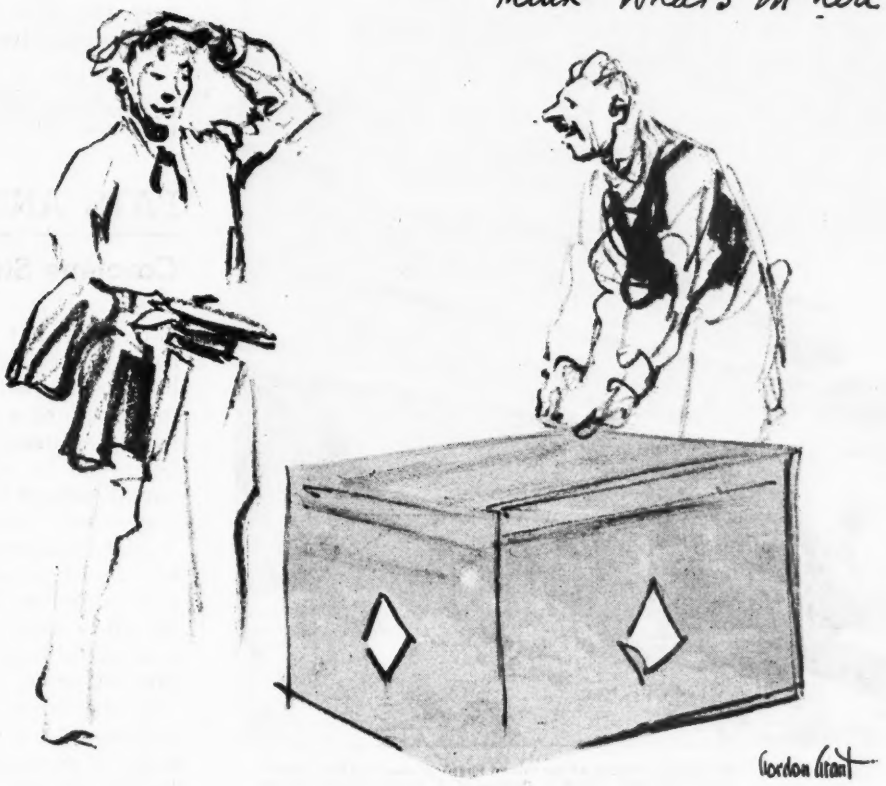
Sanitary Curds

PROCESSING equipment designed to avoid draining and manual handling and produce a clean, sanitary and uniform curd, is described in a patent specification.

The milk is aerated by bubbling a noncondensible gas through it. Proportioning pumps feed a measured volume of acid through a distributing device into the milk at the upper end of a vertical pipe kept filled with the liquid. Precipitation takes place as the milk flows downward. Baffles may be used to increase turbulence.

The uniform precipitate is forced by hydraulic pressure into a washing tank at a point well below the surface. Because of the gas entrapped in the curd, it rises and is

Never mind the heat
think what's in here!



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FRESH FOODS EVERYWHERE

Coast to Coast Deliveries

for Perishables

All frozen foods are in the category that requires scientifically controlled temperature and the utmost speed in transportation.

Fortunately for executives who are planning enlarged markets for perishables, the Church Containers which have played such a vital part for the Army and Navy in handling blood, vaccines and other commodities requiring controlled low temperatures while in transit, are again available to food processors.

They will then have at hand an efficient means for handling a ***most important part*** of their output, namely that going into undeveloped territories where dependence on high quality and freshness must be built up.

Church Containers are constructed for precisely that service. They assure you a means for getting your product to its destination by fast express and with a temperature rise of less than 3 degrees per day. All the details of collection, delivery and return of container are handled by the Railway Express Agency.

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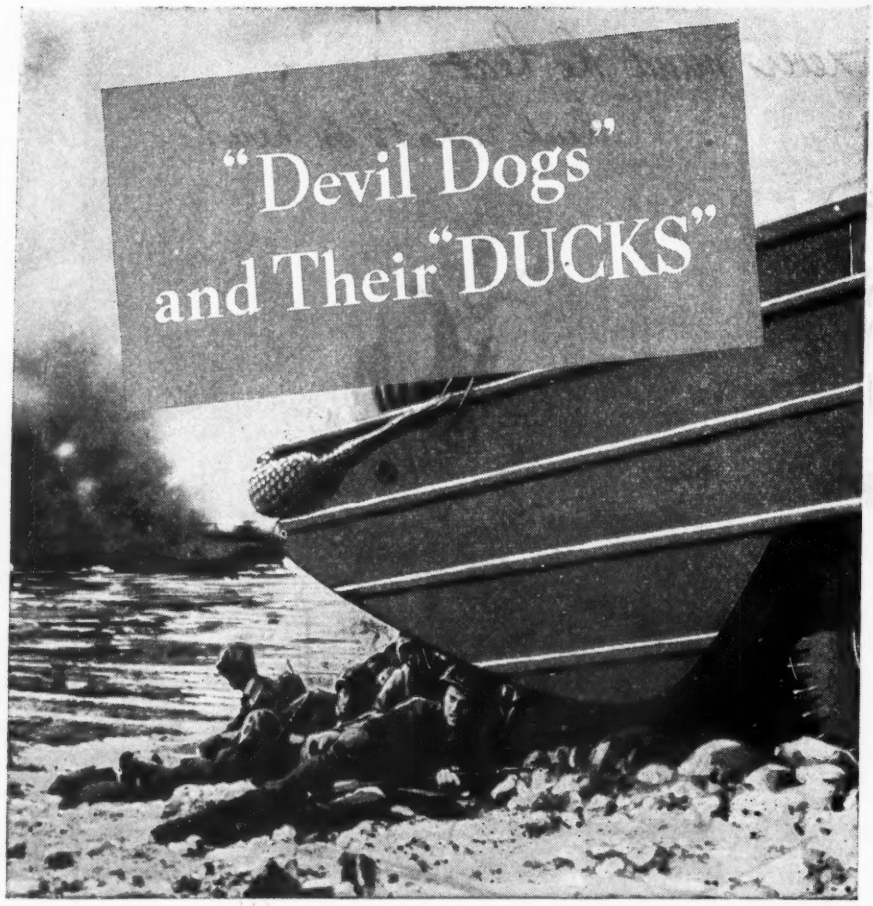

At Peleliu, Marines of the famed First Division "hit the beach" behind a GMC "Duck." Official U. S. Marine Corps Photo

GMC started to produce "Ducks" at about the same time that the Marines started to "jump all over the Japs" in the Pacific. Since then, the Navy's amphibious fighters have used GMC's amphibious trucks in a score of successful assaults from Guadalcanal to Guam.

At Arawe and Cape Gloucester, invasion beaches were blasted by a blazing barrage fired from "Ducks" equipped with rocket guns. At Saipan and Tinian, Leathernecks used many of these "landing boats on wheels" to help stage the surprise attack that put big B-29s within bombing distance of Japan. At Iwo Jima and Okinawa, the Marines were supported by GMC "Ducks" through some of their fiercest Pacific fighting.

The "Duck" makes an ideal transport vehicle for island hopping "Devil Dogs" because, boat and truck combined, it follows the fighting through sea, surf, coral sand and jungle swamp.

In addition to being one of the largest producers of military vehicles, over 575,000, GMC is building many commercial trucks for essential users. Civilian GMCs are powered by engines of the same basic design as the famous "270," used in the GMC "six-by-six" . . . the "Workhorse of the Army."

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BUY MORE WAR BONDS

GMC TRUCK & COACH DIVISION
GENERAL MOTORS

HOME OF COMMERCIAL GMC TRUCKS AND GM COACHES
VOLUME PRODUCER OF GMC ARMY TRUCKS AND AMPHIBIAN "DUCKS"

removed from the surface by a conveyor which carries it under wash sprays. Whey is withdrawn from the bottom of the separating tank. A baffle wall in the tank serves to keep the whey and wash water in their respective zones.

Digest of U. S. Patent 2,368,919, issued Feb. 6, 1945, on an application dated June 11, 1942, to E. L. Fritzberg, and assigned to General Mills, Inc.

FATS AND OILS

Carotene Stabilization

CAROTENE is very stable in cacao butter, so that its incorporation in concentrated rations, such as chocolate bars, with that ingredient might afford a satisfactory way of supplying provitamin A. It can also be added in cheese, butter, margarine, peanut butter, other spreads and salad dressings.

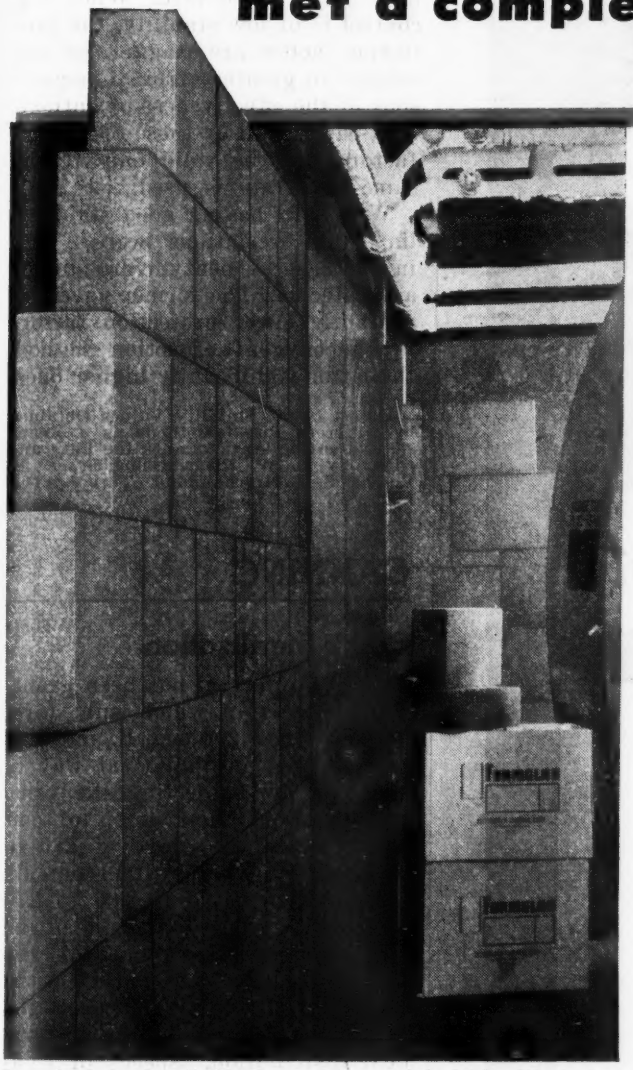
Nordihydroguaiaretic acid (NDGA), with a phospholipid or citric acid, stabilizes the carotene in edible oils. Loss of carotene may be related to destruction of naturally present or added antioxidants during the course of the induction period, rather than to the development of peroxides. With lard, cacao butter and coconut oil under accelerated test there appears to be no relationship between the accumulation of peroxides and loss of carotene. In cottonseed oil, accumulation of peroxides and loss of carotene proceed simultaneously and begin with storage. Carotene is here destroyed at higher peroxide numbers than in the other oils. The high peroxide numbers may be related to high linoleic acid content. In lard and cottonseed oil, the carotene has practically disappeared at peroxide numbers 20 and 120, respectively, which correspond to the end of the induction period in the Swift stability test.

Digest from "Stabilization of Carotene with Nordihydroguaiaretic Acid and Other Antioxidants," by E. Bickoff, K. T. Williams and M. Sparks, *Oil & Soap*, vol. 22, 128-31, May, 1945.

Comparative Stability

FAIRLY good agreement between results on lards by the Swift stability test (active oxygen), oxygen absorption (Barcroft-Warburg apparatus) and "accelerated" storage (oven tests) were obtained in the course of an investigation on the improvement of lard with antioxidants. In the few cases where marked discrepancy was noted, there are indications that the substances added influence the course

How this extra strong insulation met a complex moisture problem



Foamglas being installed in the stock house of the Weber-Waukesha Brewing Co., Waukesha, Wisc.

Physical Properties of Foamglas*

Specific Gravity....0.17 (10 to 11 lbs./cu. ft.)
K (conductivity at 50° F.)..... 0.40 Btu/hr./sq. ft./°F./in.
Coefficient of Expansion (°F.).....0000046
Specific Heat...16 to .19 Btu/lb./°F.
Crushing Strength..150 lbs./sq. in.
Modulus of Rupture..90 lbs./sq. in.
Impact Strength (center drop-increment method on 8" x 16" x 5" thick specimens supported on a 12" span).....66 ft.-lbs.
Absorption (24-hr. immersion in water) 0.4% by volume—2% by weight (all at surfaces)
Air Infiltration or Permeability...0
Capillarity.....0
Volume Change with Moisture...0
(Data supplied by Pittsburgh Corning Corp.)

INSULATING a refrigerated high humidity room in a cold climate presents special difficulties in controlling moisture and frost. Armstrong's engineers solved this problem, in one instance, with an unusual construction.

Inside a brewery stock house in Wisconsin, temperatures were moderate but humidity was high, while outside winter temperatures often went well below zero. If moisture got into small crevices between the building wall and the insulation, and froze there, the insulation would be damaged. This particular outside wall was very rough and backplastering was impractical. If insulation were set directly against this wall, small air spaces would be left which might cause trouble.

Armstrong's Contract Service overcame these difficulties with Foamglas* insulation. This exceptionally strong and rigid material was erected as an independent wall, 3 stories high, set a minimum of one inch away from the building wall. The space between the two walls is provided with special drains so that moisture and frost cannot collect. Also since Foamglas is a positive vapor-barrier, moisture from indoors cannot get into this space through the insulation.

Foamglas insulation offers other advantages. It cannot sag, shrink, swell, or decay. And because it is made of tiny glass-walled sealed cells, Foamglas is also vermin-proof and fireproof. It provides lasting insulation efficiency.

For many refrigerated processes operating under unusually exacting conditions, these special qualities of Foamglas can be utilized. For full information, write today to Armstrong Cork Co., Building Materials Div., 4209 Concord St., Lancaster, Pa.

* Reg. U. S. Pat. Off. Product Mfg. by Pittsburgh Corning Corp.

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Complete Contract Service For All Temperatures

From 300° Below Zero

To 2600 Fahrenheit

Now-No Need To Tolerate
Smelly Disinfectants

There's Absolutely
NO ODOR
OF ANY KIND
WHEN YOU USE

ODORLESS
Sasoco Disinfectant
PATENT PENDING

★ Non-Irritating
★ Highly Germicidal
★ Offers Complete Stability

This completely odorless disinfectant will completely sterilize utensils, shelves, floors, thus insuring absolute cleanliness. It leaves a fresh, clean atmosphere in wash rooms and storage rooms . . . guarantees perfect sanitation . . . *without the slightest trace of any odor.* Sasoco is harmless to hands. It comes in a crystal clear amber color, and constantly undergoes outside, unbiased laboratory tests to check its efficiency.

Available in Phenol Coefficient:

4-5 Industrial Grade—Also in 2-3, 8-9

Completely Stable in Storage or in Solution

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as well as the rate of the oxidation.

Synergism was much more pronounced in a series of tests with factors added to a lard having a low stability than when the same substances were used in an initially more stable substrate. When the control is of low stability, the protection factors are exaggerated and subject to greater error. Comparisons of the effectiveness of antioxidants as judged by these protection factors may be valid only if the same substrate is used.

With lard having good stability, important variations were found in the case of benzylhydroquinone and catechol. The former gave significantly lower protection factors by the oxygen absorption method, the latter significantly higher ones.

Digest from "Stability Values Obtained by Different Rapid Methods as a Means of Evaluating Antioxidants for Fats and Oils," by R. W. Riemenschneider, F. E. Luddy, S. F. Herb and J. Turer, *Oil & Soap*, vol. 22, 174-7, July, 1945.

CANNING

Quick Sterilization

PATENT protection has been granted a process in which milk forewarmed below 200 deg. F. and then concentrated in the usual way is sterilized by subjecting the cans, rotated about their axis, to temperatures in the range of 280 to 300 deg. F., whereby the contents are rapidly heated to 260 to 270 deg. F. The seam on the side of the can and the gas confined in the headspace both contribute to the agitation of the liquid when the can is rotated, aiding in uniform heat distribution. Speeds of rotation of 100 to 200 r.p.m. are required.

The rotating mechanism is located in an autoclave into which steam under pressure can be introduced, followed by cold water and compressed air to accomplish an equally rapid cooling.

An inert gas is used to replace the oxygen in the headspace before sealing, since milk sterilized in this way does not develop antioxidants and is subject to oxidized flavor on storage. In addition to removal of oxygen from the headspace, it is recommended that the evaporated milk be protected from contact with air after it is drawn from the vacuum pan and that water or milk used to standardize the product be deaerated.

Digest from U. S. Patent 2,372,239, issued March 27, 1945, on an application filed March 3, 1941, to Randall Whitaker, R. P. Myers and R. E. Homberger, and assigned to Sealtest, Inc., Baltimore, Md.

FORMULAS FOR FOODS

FORMULA NO. 550

Prepared Mix for Buttermilk Biscuits

Pastry flour	10 lb.
High fat soya flour	3 lb.
Buttermilk powder	1 lb. 8 oz.
Salt	3¼ oz.
Soya oil	3 lb.
Corn sugar	12 oz.
Baking powder	1 lb. 8 oz.

Dry Mix

Sift the salt, sugar, milk and soya flour together thoroughly, then sift through the white flour. Put this into a mixer and blend in the oil very slowly. It is best to use an oil dropper attached to the machine so that the oil is very evenly incorporated as the mix is agitated.

After blending, sift again, and put in closed containers or package for future use.

To Make Up

To each 8 oz. of the mix add approximately 6 oz. of water. Put the mix into a bowl and add the water gradually, using more if necessary to make a rather soft biscuit dough. Easier mixing may be obtained by sifting the dry mix.

Allow to stand about 15 minutes. Put on board, knead slightly, then roll and cut into rounds ½ in. high. Bake at 425 deg. F.

Formula from Laura K. Track

FORMULA NO. 551

Sweet Potato Pie

Granulated sugar	12 oz.
Salt	1½ oz.
Cinnamon	½ oz.
Ginger	⅛ oz.
Low-fat soya flour	1 lb. 1 oz.
Steamed sweet potato pulp	7 lb.
Enzyme-converted corn sirup	3 lb.
Molasses	12 oz.
Water	7 lb.
Whole eggs	1 lb. 8 oz.
Butter or substitute	6 oz.

Directions

Mix together thoroughly the sugar, salt, spices, soya flour and freshly steamed sweet potato pulp. Add the enzyme-converted corn sirup and molasses with the water, which should be warm. Allow this mixture to set for at least 2 hours, to allow the sweet potato to reconstitute. Prior to depositing in the shells, add the eggs and butter substitute, stirring thoroughly.

Fill in deep unbaked pastry-lined tins that have been allowed to dry. Bake at 425 deg. F. When filling puffs slightly, remove from the oven.

This is a suggested formula. The spices and salt should be varied according to taste. Molasses may be omitted, but if used should be of the best grade. The butter or substitute may be omitted.

One No. 10 can of sweet potatoes can be substituted for the fresh steamed pulp, if available.

Formula from A. E. Staley Mfg. Co.

FORMULA NO. 552

Highland Butterscotch Cake

Brown sugar	3 lb. 8 oz.
Butter	5 oz.
Milk	2 lb. 8 oz.
Vanilla	¾ oz.
Shortening	12 oz.
Cake flour, high-grade	2 lb. 8 oz.
Salt	¾ oz.
Whole eggs	1 lb. 4 oz.
Baking powder	1¼ oz.
Butterscotch base	4 lb. 9 oz.

Directions

Butterscotch base: Mix together in a copper kettle 2 lb. of brown sugar, the butter, and 8 oz. of liquid milk. Boil to 250 deg. F., stirring constantly after it starts to boil. Take off the fire and stir in gradually the rest of the milk and the vanilla. Cool this mixture to 75 to 80 deg. F. before using. Always stir the cooled base stock well before using.

Batter: Cream together the remaining 1 lb. 8 oz. of brown sugar, which must be sifted, the shortening, 8 oz. of cake flour and the salt. Add one-third of the eggs while creaming for approximately 3 minutes on low speed, then add the rest of the eggs gradually, continuing to cream for about 9 minutes.

Use 4 lb. 9 oz. of the butterscotch base, which is added in two portions. Stir in the first portion, then sift the dry ingredients and mix with these to a smooth batter. Continue mixing while adding the second portion of the butterscotch base. Mixing time at this stage should be about 3 minutes.

Scale 1 lb. 6 oz. for pan 7¾ in. square and 2 in. deep.

Bake at 375 deg. F. for 30 to 35 minutes. Remove while warm.

Formula from Lever Brothers Co.

FORMULA NO. 553

Cracked-wheat Streussel

Cracked wheat	2 lb.
Honey	8 oz.
Salt	½ oz.
Water	1 lb. 8 oz.
Butter or substitute	8 oz.
Granulated sugar	1 lb. 8 oz.
Egg yolks	6 oz.
Cinnamon	½ oz.
Pecans, ground	10 oz.

Directions

Soak together the cracked wheat, honey, salt and water for a minimum of 3 hours. It is preferable to soak overnight.

Rub together the other ingredients, then add the soaked wheat.

Formula from Swift & Co.

FORMULA NO. 554

Peach Chiffon Pie

Frozen peaches, 4:1 sugar pack	10 lb.
High quality bakers starch	10 oz.
Granulated sugar	1 lb. 9 oz.
Fresh lemon juice	2¼ oz.
Salt	½ oz.
Water	1 lb. 6 oz.

Directions

Bring the fruit to a boil with 10 oz. of water. Mix the starch smooth with 12 oz. of water and add to the fruit gradually while stirring. Cook until clear and thick (185 to 190 deg. F.). Add the sugar, salt and lemon juice.

To make the chiffon filling, use:

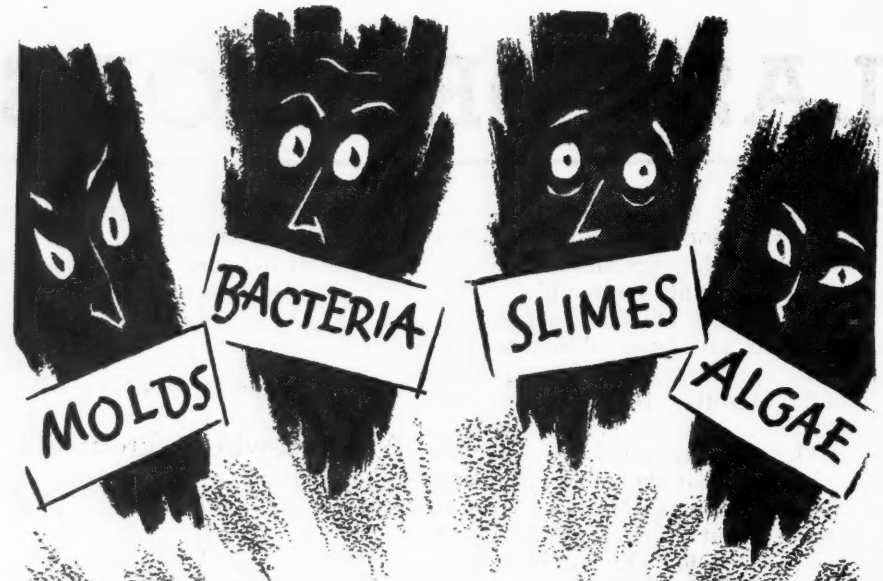
Egg whites	1 lb. 4 oz.
Peach filling	11 lb. 2 oz.
Lemon juice	2 oz.
Certified pink color	as desired

Whip the egg white to a soft peak, then add the hot mix gradually, while whipping, and continue to whip until the mixture is light and glossy, with a fine smooth texture. Lemon juice is optional.

Fill into baked shells while warm so that the mixture may set up slightly.

This should produce sufficient filling for 16 pies 8 in. in diameter.

Formula from National Starch Products



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Industrial Division

WINTHROP CHEMICAL COMPANY, INC.

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Will Agriculture Collapse?

(*Continued from page 77*)

capita. This increase of income has enlarged appreciably the demand for farm products, as we well know. But how much does it increase the demand? The answer depends upon what the economist calls the "income elasticity" of a product, which is a measure of how people spend their income as they become richer. You may recall Engel's law to the effect that people spend proportionately less of their income on necessities as they become richer. Our researches indicate that the income elasticity of farm products is low. It appears to fall at about 0.25. This means that, with a 40 percent rise in income per head, the demand for food would increase 10 percent, relative prices and other factors remaining constant.

Let us now apply to the situation at hand in the United States the quantitative changes in population and income as they affect the demand for food. Let us suppose that we come to the end of the war with an increase in our population of 6 percent, with a rise in our income on a per capita basis in real terms of 40 percent, and with an income elasticity of farm products of 0.25. This would increase the aggregate demand for farm products 16 percent. Meanwhile the supply of farm products has expanded 25 percent. Here we have a measure of the gap between the two induced by the war itself. If our exports were to become much larger than they were before the war, the gap would be reduced, but the prospects for this happening are very doubtful indeed.

We are forced to conclude, therefore, that the growth in population and the very high incomes attained during the war, if maintained, will in themselves not create enough additional demand to absorb, even at prewar relative prices, the additional supplies of farm products now being produced. Certainly there is no possibility that the highly favorable farm prices relative to other prices that prevail currently can be supported once food exports decline.

Let us look just a moment at the first decade after the war. The population in the United States may grow as little as 5 percent. Under very favorable circumstances, we may realize a growth in our income of as much as 20

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INSTRUMENT AND GAUGE DIVISION
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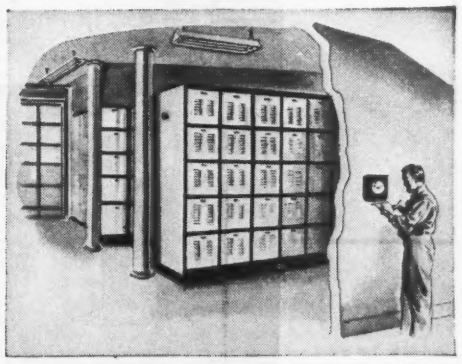
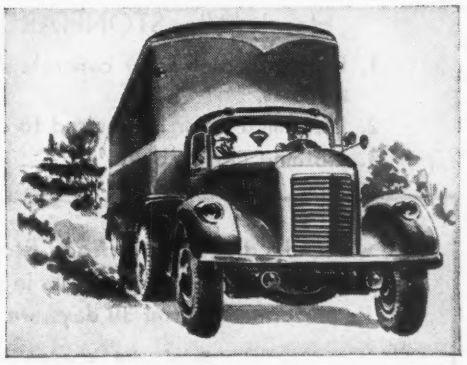
AUTO-LITE

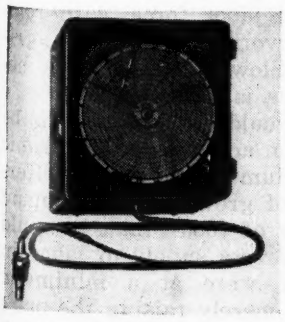
In addition to a wide range of thermometers and gauges, Auto-Lite specializes in the production of instruments of special design for use as a standard part of manufacturers' equipment. Details on request.



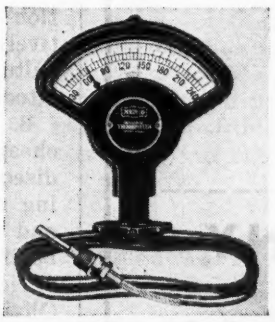
Continuous temperature cycles are charted by Auto-Lite Recording Thermometers. Used in food processing, cold storage, locker plants and for other applications where temperature recording is desired.



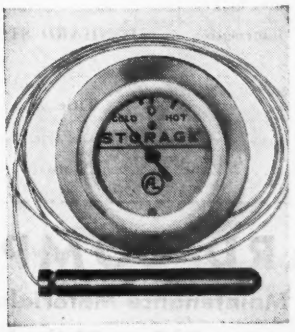
To protect tons of perishables, rolling cross-country in refrigerated trailer trucks, Auto-Lite Indicating Thermometers are mounted on the trailer front where temperature can be easily checked from the driver's seat.



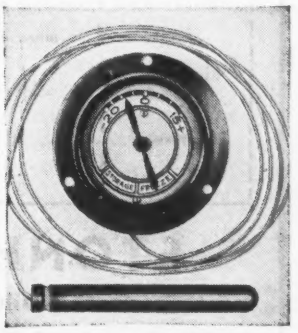
Auto-Lite Recording Thermometer, Model 500. Bourdon tube type. High visibility chart; coverage equal to larger thermometers. From $31



Auto-Lite Indicating Thermometer F-1. Well known type for food processing, locker storage, freezer rooms, refrigerated vehicles. From $20



Auto-Lite Indicating Thermometer for freezer, cold-holding and dispensing cabinets. Selection may be made from a variety of designs



Another Auto-Lite Thermometer style for indicating temperatures in freezer, cold-holding and dispensing cabinets. Ask for volume prices

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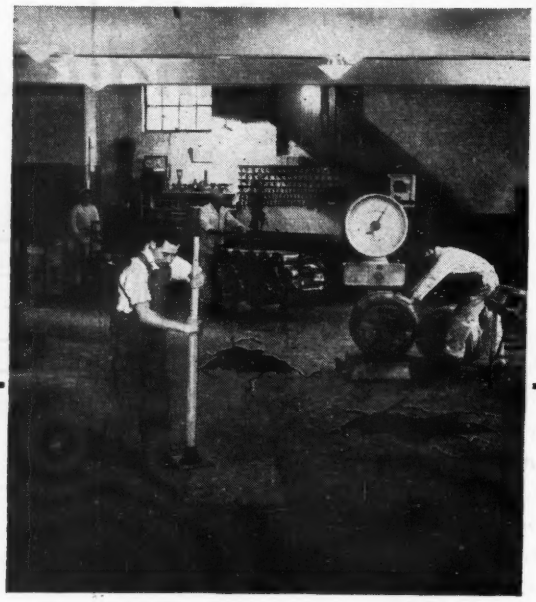
Yes, STONHARD STONFAST can be applied just that fast. Durable repairs to your trucking aisles, platforms and other vital working areas can be made instantly in places where work stoppage is not practical.



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percent per head. These two developments, should they occur, would create an additional demand for farm products of about 9 percent. With farm prices as low as 90 percent of parity, agricultural production is likely to increase upwards of 15 percent during the decade, which certainly is much more than the demand will absorb without marked changes in relative prices. The forces pushing the supply up are several, but primary among them is the rapid advance in farm technology. To a very considerable extent, this force and several of the others affecting the supply is independent of price changes, that is, their impact on production is likely to go on despite very low farm prices.

Chronic Depression

Unless the equilibrating mechanism has the capacity constantly to transfer a very considerable quantity of resources out of agriculture, the main consequences of this unequal growth of the demand and supply of farm products, with the supply so distinctly in the vanguard, will be:

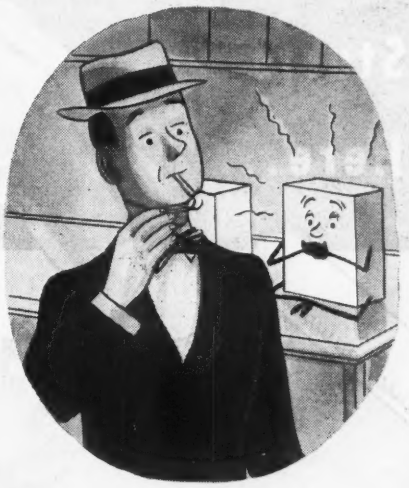
1. We would expect a chronic disequilibrium adverse to agriculture to occur and to persist, excepting during wars and for a short period during business booms and also for awhile whenever governments accumulate large inventories of farm products.

2. We would expect agriculture to be burdened constantly with an excess supply of labor, even during periods of business expansion, and of brisk job opportunities in nonagricultural industries. The burden of equilibrating the excess supply of resources in agriculture falls primarily upon the labor force simply because improvements in agricultural technology are largely labor-saving in their effects. Moreover, labor constitutes the bulk of resources employed in agriculture, and workers are transferable. As our economy develops, we find that we constantly require a redistribution of the labor force, with relatively few workers engaged in agriculture. Slowly, but always belatedly, this is happening.

3. We would expect food to be cheaper—on account of the chronic disequilibrium caused by the differing rates of growth of the demand and supply of food—than it would be if the excess supply of labor in agriculture were at a minimum. Obviously, merely raising the price of food by governmental action does not remedy this situation since

"SILENT SALESMEN" WILL TAKE A BACK SEAT IN TOMORROW'S STORES

"……!"



"……!"

"HEY, LADY, LOOK AT ME!"

"RIGHT HERE, MISTER!"

You'll need a package that talks. And there's nothing like Coated Lithwite to make it speak up and sell

ONE THING CERTAIN about tomorrow's stores . . . there's going to be *more* self-service, not less. *More* mass displays, not fewer. And that means a greater need than ever for packages that can outtalk competition at the point of sale.

Many a leading manufacturer has already discovered that cartons made of *Coated* Lithwite, the revolutionary, machine-coated paperboard, have a crispness and brilliance that get attention, make them speak out above competition. *Coated* Lithwite holds up colors with eyecatching brilliance, enables you to present a persuasive, "speaking likeness" of your product. And its velvet-smooth surface gives your package a look and feel that says there's *quality* inside.

As you plan your postwar packages, keep *Coated* Lithwite cartons in mind. The day is coming when Gardner-Richardson will again be able to accept orders for cartons made of this revolutionary machine-coated paperboard that turns "*Silent Salesmen*" into *talking* packages.

CLIP THIS!

File this Coated Lithwite memo for reference when this quality paperboard is again available.

1. Made by a revolutionary process. *Coated* Lithwite is the brighter, whiter paperboard that is formed, made and coated in one high-speed operation. Proved and improved for six years.

2. Means more eye-appealing cartons. *Coated* Lithwite's smooth, velvety, chalk-free surface forms a better base for printing inks and plates—reproduces even the smallest type cleanly, crisply. Brings colors up brilliantly—gives halftones a sharp realism.

3. Fewer jammers and leakers. *Coated* Lithwite scores without flaking or shattering. Takes a positive, tight seal.

The GARDNER-RICHARDSON Co.

Manufacturers of Folding Cartons and Boxboard

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Sales Representatives in Principal Cities: PHILADELPHIA . CLEVELAND . CHICAGO . ST. LOUIS . NEW YORK . BOSTON . PITTSBURGH . DETROIT

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Write for Bulletin No. 1213 — to Orr & Sembower, Inc., 932 Morgantown Rd., Reading, Pa.

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it does not get at the underlying causes.

There are other important consequences, particularly in the international sphere, which I shall not discuss here. Suffice it, therefore, to stress the long-run character of the depression in agriculture because of the chronic disequilibrium, the excess supply of labor resources in agriculture, and the implications of these to the price of food. In the task of evolving appropriate policy, it is essential that we do not lose sight of the fundamental forces that are persistently reshaping both the supply and demand of farm products as our economy develops. Nearly all of our policies forged during the inter-war years were focused on farm relief dealing with one emergency after another. As a consequence, the measures which have been taken in behalf of agriculture do not deal with the more basic causes touched upon here.

—End—

18 Ways to Get Jump On Competitors

(*Continued from page* 73)

stantly testing new formulas, as well as those for its old products, to see whether new or better items are possible. There always is a well-worn path to the door of the baker of an exceptional product.

16. About Sales Costs

Advertising and sales costs ought to be analyzed. Where is the money being spent and what results is the bakery getting? Simple tests can be devised to gage returns from radio, direct mail and newspaper advertising. Sales costs can be broken down to determine the best salesmen and the best territories. Sometimes a bakery will show greater profits by more concentrated sales effort in a smaller sales territory. Bonus payments for salesmen should depend not only on volume but on costs.

17. More Pay Cuts Costs

The bakery should be as fruitful a place for incentive payments as any other manufacturing plant. In addition to the competition among bakeries for the business available, there is the more important competition between the baking industry and other industries such as meat, fruit, vegetables, candy and amusements. In the long run, that

Form J — General Purpose Application

The Top Half Closed on Century Form J Motors Gives EXTRA PROTECTION

Against Falling Solids and Dripping Liquids

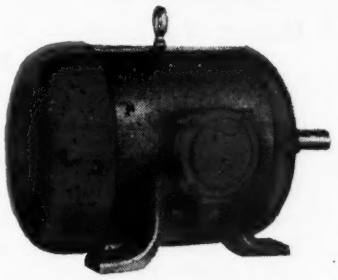
The Century Form J motor is a general purpose, open rated, continuous duty motor with an extra protective safety factor. The upper half of motor frame is completely closed, reducing the possibility of dripping liquids and falling solids entering the vital parts of the motor.

Adequate ventilation to compensate for the partial inclosure is provided by two fans to force a blast of cooling air around the bearings and ventilating passages surrounding the windings.

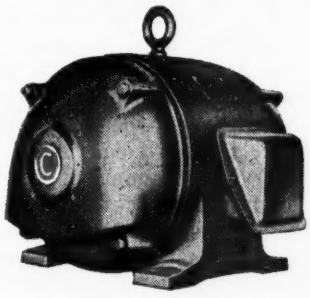
A Century Totally Enclosed Fan Cooled motor is available for installations requiring protection from atmospheres charged with abnormal quantities of metallic or abrasive dusts or powders, or abnormal amounts of acids, or alkali fumes.

For complete information on how Century motors are being used in the food industries — and how they can bring benefits to you, call in a Century engineer, today.

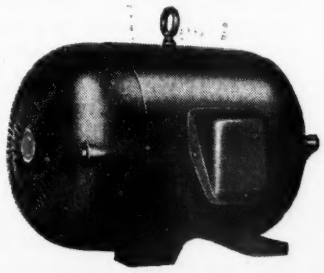
3 Other Types of Protection



Century Explosion Proof Motor



Splash Proof Protection



TEFC — Protects Against Destructive Dust, Grit, Powdered Materials

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CENTURY ELECTRIC CO.

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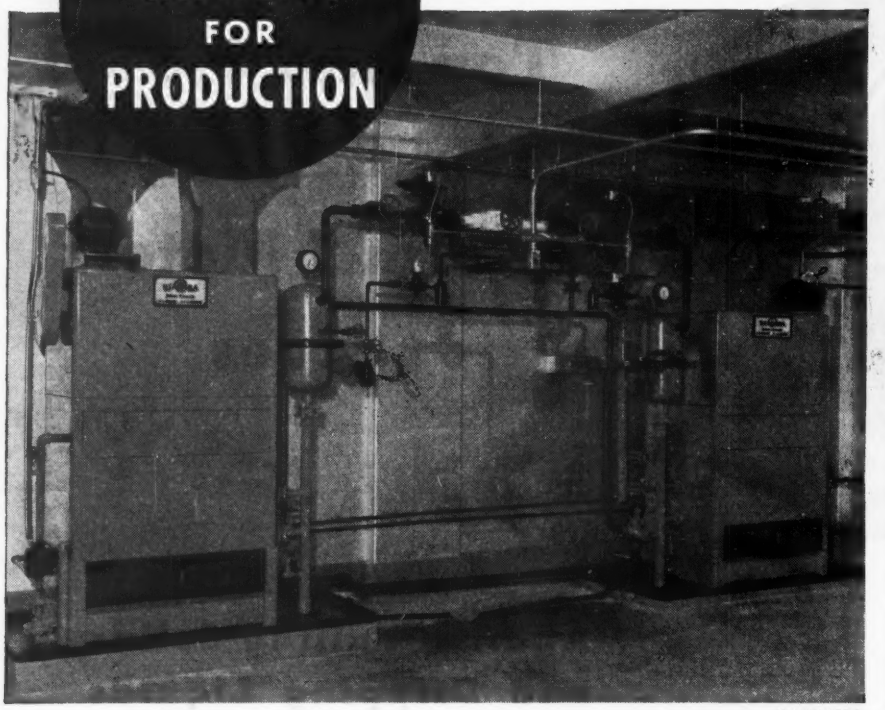
MORE CAPACITY FOR PRODUCTION

with NIAGARA "No Frost" METHOD



PATENTED

● You obtain increased productive capacity. . . without adding to refrigeration compressor equipment . . . by installing the NIAGARA "No-Frost" METHOD of refrigeration for pre-cooling chilling, freezing or holding storage . . . for instance, all meat products, the freezing of foods, the hardening of ice cream.

You cool to any temperature required with spray type fan coolers, using NIAGARA "No-Frost" LIQUID.

There is no frosting or de-frosting. NIAGARA "No-Frost" LIQUID is maintained automatically in correct proportions. By preventing frosting of coils, you gain the *constant use at full capacity of your equipment.* Old systems lose this full capacity the first hour ice starts to form upon coils.

Experience with the NIAGARA "No-Frost" METHOD proves that savings in power pay for the equipment. *Gains in capacity increase plant production earnings.*

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industry which has low costs will do the best for itself and its employees. The standard-hour and group-bonus methods of incentive payments can be applied in bakeries after proper operating methods have been established to the satisfaction of employers and of labor unions.

18. Pyramiding Progress

No bakery should be expected to make in one year all the improvements suggested in this discussion and other improvements that a study of the individual bakery will suggest. A program should be set up, however, after due study. Those improvements that will show the best return should be made first and the savings earmarked for further improvements in the following year. Such procedure will guide the progressive bakery into a successful future for its owners and employees, secure against the increasing competition that most certainly is coming.

—End—

Hiring Veterans— A Common-sense Plan

(*Continued from page 75*)

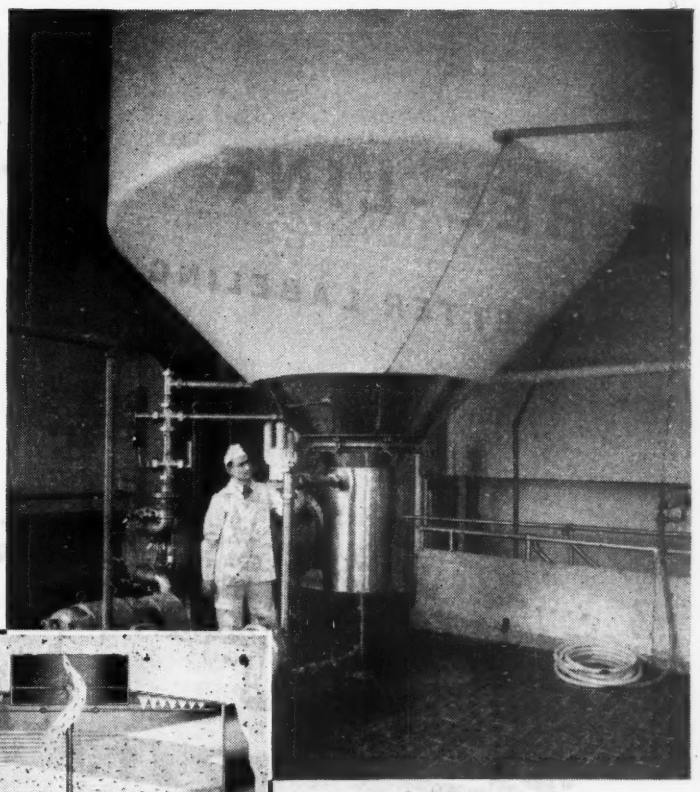
This conclusion is based on a recent study made in 43 industrial establishments of the War and Navy departments. The results of this study reveal: (1) A much lower rate of turnover among the physically handicapped, a contributing factor to their employment stability; (2) no appreciable difference in the quantity and quality of work output and efficiency ratings between the able-bodied and the physically impaired; and (3) fewer than 10 percent of the impaired workers were given special consideration with regard to such matters as transportation, lunch and rest periods, hours of work and special equipment.

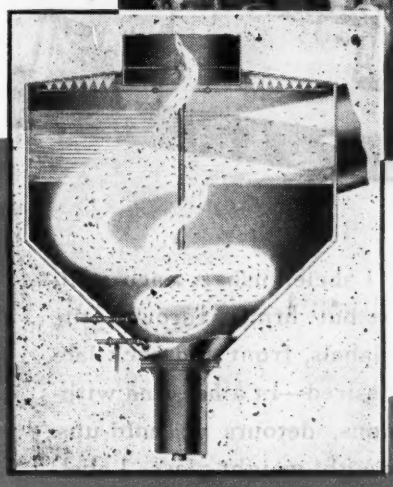
More than 50,000 persons with serious physical handicaps were successfully placed in governmental industrial establishments between Oct. 1, 1942, and Feb. 1, 1945, according to the Civil Service Commission, and in the last 20 months over 5,500 of these persons so placed have been disabled veterans. The Army Special Service Division recently stated that 60 percent of the men in the Army do not intend to return to their old jobs after the war. Ninety percent of men in the Army have benefited from Army training and have acquired new skills. An opposite viewpoint on

You Should Know

the Advantages of THE LIQUID COLLECTOR

(Outstanding Feature of GRAY-JENSEN *Spray Drying* EQUIPMENT)





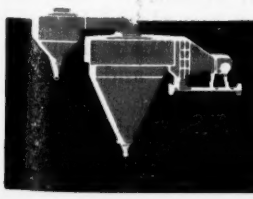
Diagrammatic view of the Liquid Collector showing how entrained powder is recaptured and dissolved as the exhaust air from the drying chamber absorbs moisture to near saturation.

The Swenson Gray-Jensen Spray Drying Process embodies a number of superior features, including the Liquid Collector which provides the following advantages:

- Recovery of powder substantially equal to the full weight of solids in the liquid.
- Elimination of cloth bags and handling.
- Strict sanitation with easy cleaning.
- Pre-condensing action . . . increasing fuel efficiency and rate of drying.

The Liquid Collector contributes toward the 10% to 15% lower operating cost of the Gray-Jensen Spray Drying Process.

Get the full story of dried foods production efficiency and economy by writing today for Bulletin D-100.



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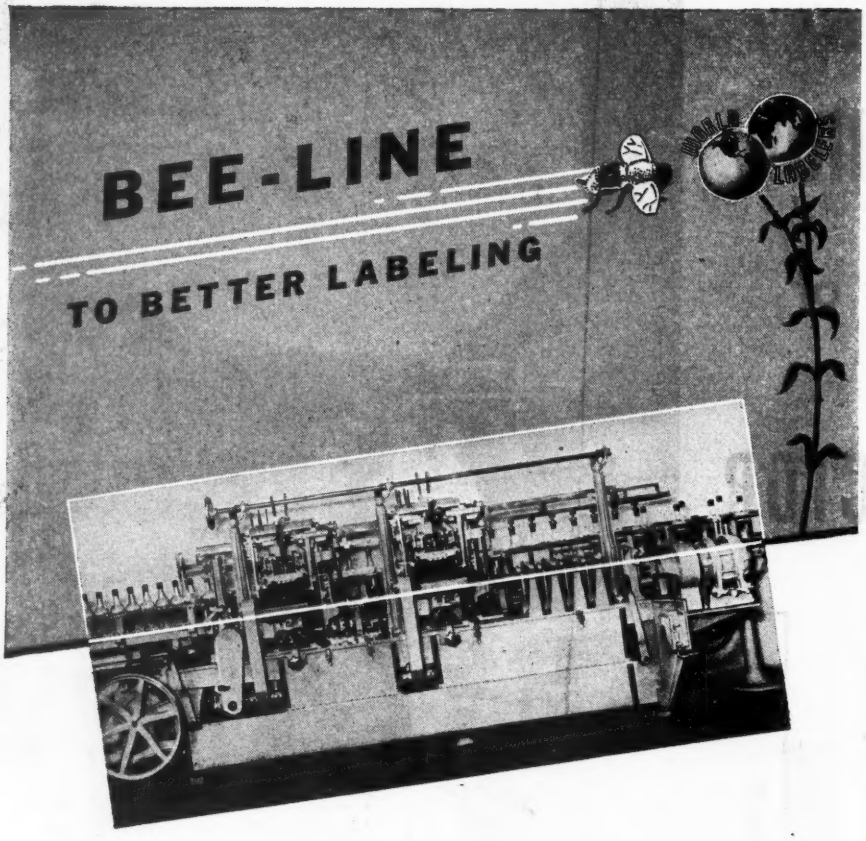
DIVISION OF WHITING CORPORATION
SPRAY DRYER DEPARTMENT, 221-B N. La Salle St., Chicago 1, Ill.



WORLD's BEE-LINE Labeler ushers each individual container gently but firmly through the labeling process—front labels, front and back labels, neck labels, too, if desired—in a *bee-line* without traffic jams, collisions, detours or hold-ups. It's ideal for the modern light weight glass. Labeling is uniformly clean, precise, smooth and firm.

Round, square, flat, oval or panel containers, tall or short, fat or thin—the BEE-LINE handles them all with equal consideration and dispatch. For quality labeling and lots of it, year in and year out, you get the best in the WORLD BEE-LINE.

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ECONOMIC MACHINERY COMPANY

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returning veterans is taken by the Apprentice Training Service, Veterans Administration, which has voluminous plans for the reemployment of the returning veterans, both able-bodied and disabled.

Concrete plans have been worked out by the Administration for all kinds of industries. These plans fall into three distinct classes:

1. Individual plant programs set up and carried through by management alone, in connection and with approval of Veterans Administration.
2. Individual plant programs established in cooperation with management and the labor union in the particular plant. (Arranged by the Veterans Administration.)
3. Area-wide industrial programs, including representatives from management and labor working together to form a training program for the specific industry in the entire area. In this manner, the apprentice can be moved from plant to plant to receive a more diversified and complete training in his particular skill.

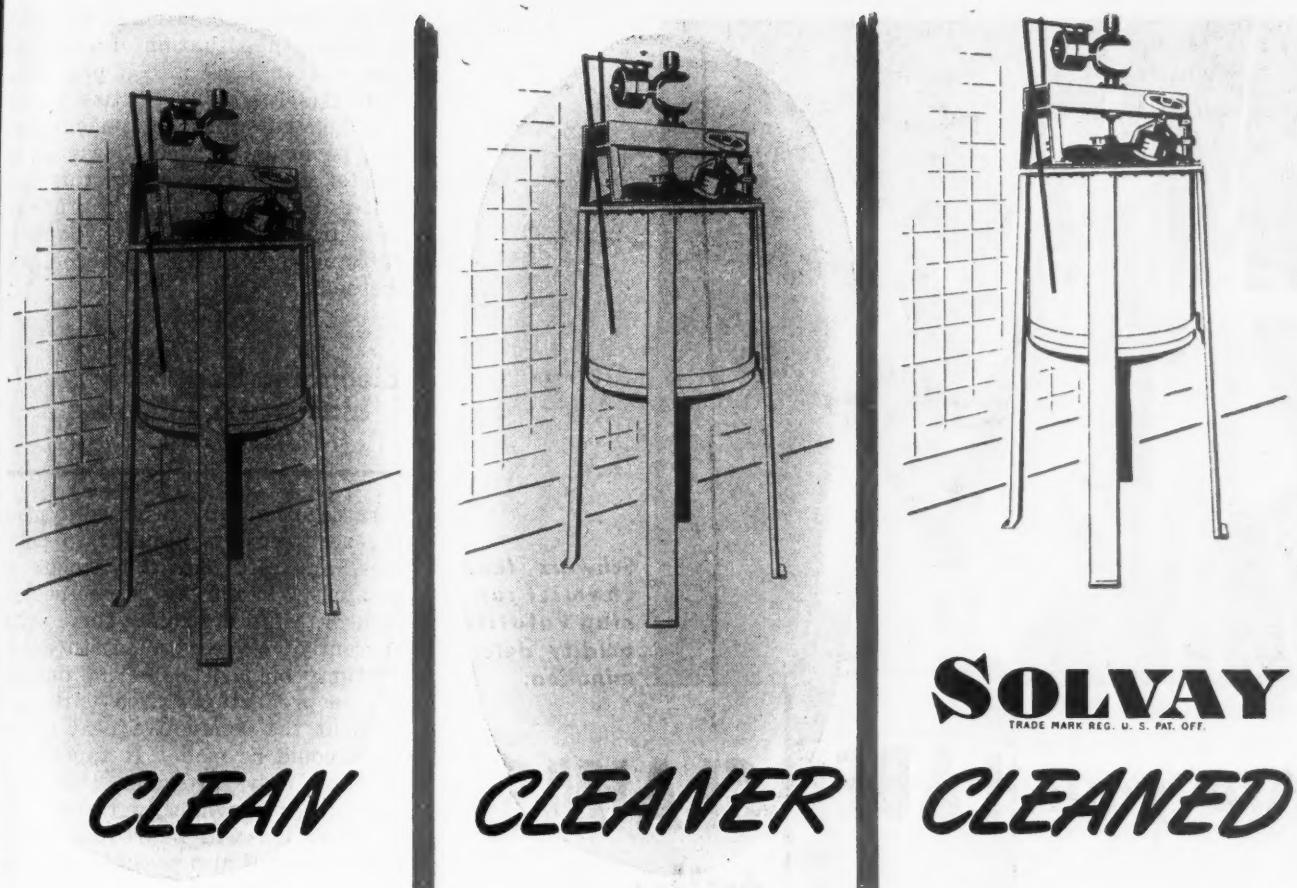
Training Pay

Under the training program for disabled war veterans, these men receive compensation from the government, the amount varying with the degree of their disability. When they apply for apprentice training, the company in whose employ they are training pays them a certain base rate wage, dependent upon the regular wage scale for the job. They are entitled to an increase every six months. But the increase in pension and wages together cannot exceed the pay received by the regular man on the job. When the combined wage and pension income goes up, the government's portion is reduced gradually.

The GI Bill of Rights provides for training of able-bodied veterans and is virtually the same as the program for disabled war veterans, except that there is a definite ceiling on what the veteran can receive. A single man can receive up to $50 a month; a married man, $75. Also, the money paid the man during his apprentice training will be deducted from his government bonus if he applies for that later.

The Veterans Administration has extensive job analyses on physical activities involved and working conditions prevailing on each specific job in an industry. Veterans under this plan are placed in positions best suited to their past experience, capabilities and (if injured) their disability.

Just what degree of intricacy the various plans reach is of lesser importance than the fact that indus-



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CLEANSING EFFICIENCY

MAXIMUM FOOD PROTECTION

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USE SOLVAY CLEANSERS

. . . Cleaned better the Solvay method! That's the only kind of cleanliness you can afford in your plant . . . because even a fraction of dirt of any variety or shade can cause contamination and product spoilage.

You can always maintain maximum cleansing efficiency anywhere in your plant with a Solvay cleanser. The reason: every Solvay cleanser is scientifically *better* . . . the result of specialized research and practical use in the cleaning function it is designed to do. For over 50 years, Solvay has been engaged in the manufacture of cleaning compounds. To the food industry, it offers a complete line of cleansers covering practically every cleaning need.

Let Solvay Technical Service help solve your individual cleaning problems for *good.*

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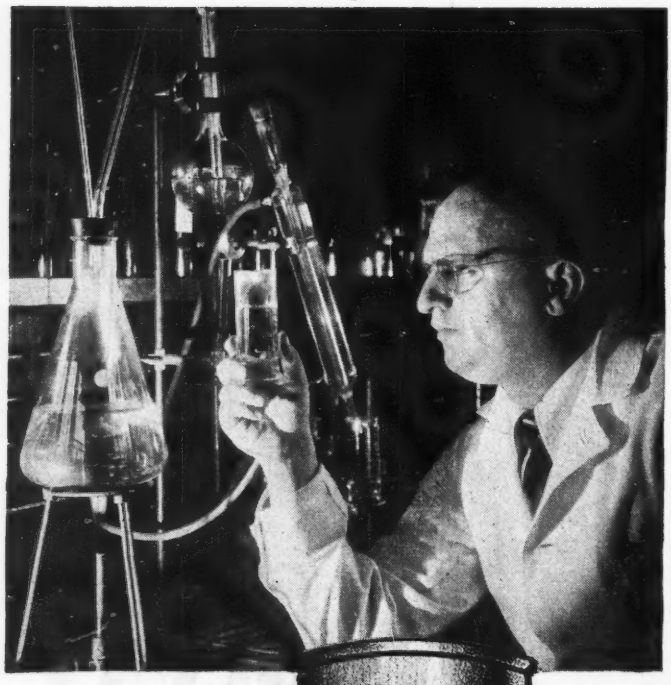

Schwarz food chemist running volatile acidity determination.

Are your LABEL CLAIMS fully protected?

Claims made on labels and in advertising must remain valid from the completion of processing right up to the consumption of the product by its purchaser.

One of the vital services rendered to food and beverage manufacturers by Schwarz Laboratories is the establishment of standards for safeguarding the ingredients, processing and keeping qualities of packaged products. This service may embrace analyses of samples for compliance with established quality standards; inauguration of routine testing procedures; recommendations for sanitary precautions and manufacturing procedures. It may result in the prescribing of definite formula changes and new raw materials.

The diversified services of Schwarz Laboratories include chemical and biological analyses, vitamin assays, industrial fermentation and yeast cultures, complete food research, process examination, sanitation, food plant design, and scientific legal testimony. A new, illustrated, 20-page bulletin — *"Scientific Quality Control of Foods and Beverages"* describes the wide scope of Schwarz Laboratories activities, and should interest any manufacturer in these fields. Copy free on request.

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LABORATORIES, INC.

try is wholeheartedly and humanely facing the situation of orienting the veteran back into a peacetime industrial status. Curtiss Candy Co. believes that the orientation can be made in such a way as to bolster the returnee's morale and self-esteem rather than confuse or discourage him by either *laissez-faire* or governmental paternalistic methods.

—End—

Electronic Heat Inactivates Enzymes

(*Continued from page* 92)

paratus specifically designed to meet the requirements peculiar to potatoes, and with larger batches of potatoes, preferably steam-peeled. If such tests were run at some plant currently engaged in potato dehydration, comparisons of the quality of the product prepared with and without the conductive heat treatment could be made. It appears to us not only probable that the amount of enzymically responsible discoloration will be reduced to a minimum, but also possible that the blanching process itself, now carried out on the dices, could be effected by conductive heating on the whole, peeled potato. Such blanching would require very little extra current, except that required to make up for possible heat losses.

On the basis of the preliminary data and observations presented in this paper, we should like to suggest one of several modified procedures that might be employed in the dehydration of potatoes. The potatoes, stored and washed in the usual way, could be steam-peeled (with or without preheat treatment), lye peeled or abrasive peeled. The peeled whole potatoes could then be dumped immediately into a preheat bath at 60 to 70 deg. C. to bring the potato to approximately 60 deg. C. throughout. The time it takes to reach this temperature would depend greatly upon the method of peeling. With steam peeling, plus the recommended 3-minute preheat treatment at 73 deg. C., it is doubtful whether the preheat bath suggested would be required. The warmed potatoes could then be dumped into the high-frequency heating apparatus and blanched.

Procedures now employed for the dehydration of other vegetables and food products might well be amenable to such changes as are here proposed as a result of the incorporation of high-frequency heating methods into the particular opera-

Three Little Men...
MOISTURE brings sogginess
AIR... steals freshness
LIGHT spoils aroma and flavor
Who aren't here!
No matter how hard they try, these 3 package pirates can never penetrate Reynolds Aluminum Foil to steal freshness and flavor.

Before the war most of America's famous brands... cigarettes, candy, chewing gum and many foods... were packaged in Reynolds Foil. Already manufacturers are planning to return to foil-wrapped packages... as soon as available for civilian use... proof that foil best preserves freshness and flavor.

Foil is a complete moisture—and moisture-vapor barrier. If your problem is to keep moisture *in*—foil can solve it. If it is to keep moisture *out*—foil can solve that, too! Consult Reynolds!

For many products foil has a vitally important advantage. Foil is *light-proof!* Light is a major cause of rancidity. Many foods need foil's light-proof protection. Foil preserves flavor, freshness too. Reynolds have made a special study of food packaging. Ask us for data on the many new developments.

Shipment of war material has made the most stringent demands ever known in the packaging field. Reynolds Laboratories developed 90% of the foil packages of war. This experience is now being used in the development of vastly improved packaging for consumer goods—from peanuts to pistons! A corrosion-proof method of packaging metal parts is one development that might interest you!

Reynolds, for 25 years the resourceful and progressive leader in metal foil packaging, is now perfecting many new, revolutionary protective packages. Consider foil—consult Reynolds. Write Reynolds Metals Company, Richmond 19, Virginia.

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THE FRESH-FLAVOR WRAP

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But it doesn't work that way. The corrosion resistant alloys present tough problems during fabrication. Unlike carbon steels, they have special properties which must be preserved. Any fabricator can build equipment of metal, but it takes a high degree of specialization to build alloy equipment with maximum retention of the original properties.

Strength and corrosion resistance—easier cleaning—lower operating costs—you have a right to demand these qualities in your stainless steel equipment.

For more than 50 years we have been building equipment from corrosion resistant alloys. Our mechanics and engineering staff are trained for this work. Our plant machinery, our tested procedures—have been designed for it. When next you order corrosion resistant equipment, get the extra protection our experience, skill and techniques offer. Consult with us.

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tion. The possible advantages that might be expected to accrue are:

1. Increased simplicity and better control of operation.
2. Uniformity of product as a result of uniform heating.
3. Reduced losses of soluble solids.
4. Reduced flavor losses.
5. Reduced vitamin losses.

Acknowledgment—It is a pleasure to acknowledge with grateful thanks the material assistance and stimulating advice given the author throughout this investigation by Eduard Farber.

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—End—

Freezing Cooked Foods

(*Continued from page* 98)

tion or other medium while in storage, which possibly accounts for much of the loss of aroma and flavor. Numerous other tests were run which showed that as the amount of heating prior to freezing increased beyond that required to heat the pieces throughout, there was a gradual loss of fresh green color, an increase in brown color and a progressive loss of aroma and flavor. While being held in storage, a warmed-over aroma and flavor developed in all lots which had been heated for more than seven minutes and packed loosely. The texture also was poor.

On the other hand, puree of pumpkins, sweet potatoes and a few other vegetables that were cooked and solid-packed kept in excellent condition. Rhubarb kept in better condition when unblanched, and corn-on-the-cob kept best when not only the corn was cooked but the cob as well.

The chief factor contributing to the low quality of cooked, frozen vegetables on the market has been found to be the use of low-quality vegetables to begin with.

Another factor contributing to poor quality in a cooked vegetable for freezing is the manner and amount of cooking. As cooking proceeds, in snap beans, for example, desirable flavors develop. These

YOUR PRODUCT...

Plus improved enrichment...

means greater consumer acceptance!

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Plasmolyzed Yeast Extracts for FOOD and AMINO ACID Preparations

Through a greater knowledge of the value of better family nourishment, homemakers demand properly enriched foods. Do your products meet these demands? Are you enjoying maximum consumer confidence? Do your products have a real quality sales appeal?

The answer to these questions can be found in the use of Vi-Co Natural B Complex Yeast Products and Yeast Derivatives. Vico Products Company, pioneers in the manufacture of natural vitamin B complex extracts, produce them in various forms and can supply you the type most suitable for your particular product.

Vi-Co Plasmolyzed Yeast Extracts are prepared by enzyme digestion of brewers' yeast to yield a B complex product of high amino acids content. Amino acids provide the necessary "building blocks" for healthier and stronger bodies.

Vi-Co Plasmolyzed Yeast Extracts impart a "meat-like" flavor useful in fortifying soups, bouillon cubes, tomato juice and other packaged foods, thereby creating a greater demand for your enriched products.

WE INVITE YOU TO WRITE. Our technical staff can best advise you how Vi-Co Plasmolyzed Yeast Extracts and Natural B Complex Yeast Products and Derivatives can be used to enrich your own products.

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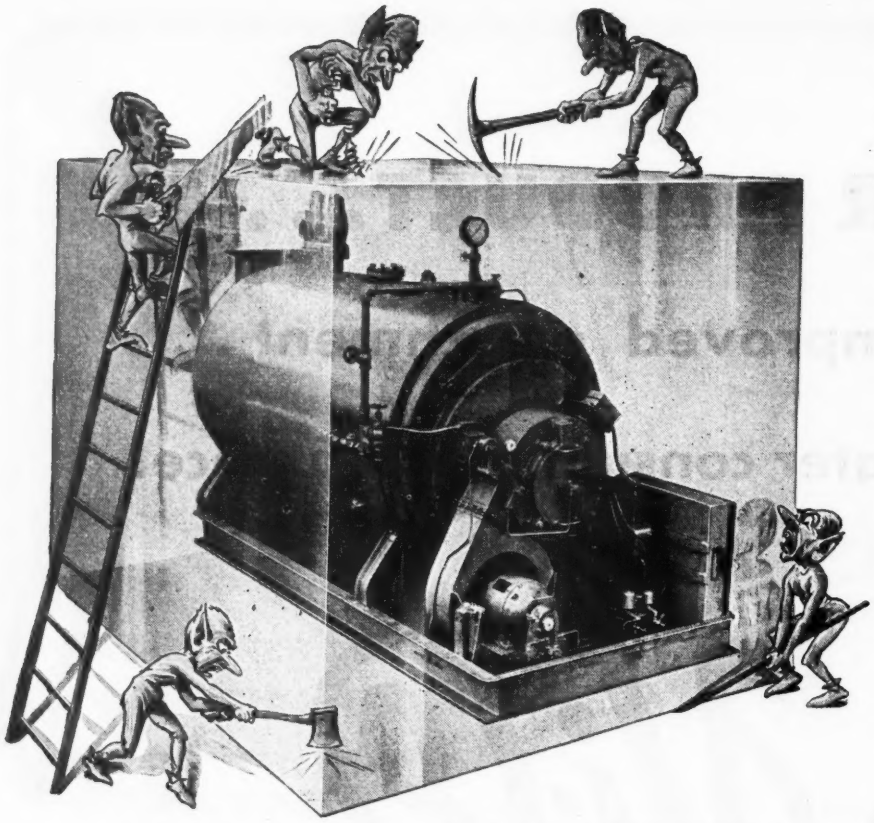
415 W. Scott Street, Chicago 10, Illinois



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When you buy a steam generator, the "know-how" that went into its designing and building is your best guarantee of continuous, trouble-free, economical operation. It is engineering know-how that produces a superior product.

That is why Cyclotherm Steam Generators are emerging from the war with veterans' reputations. Thousands of these rugged units have proved that they can "take it" and deliver under all kinds of war-time service in the Army, Navy and Marine Corps. Their record is your assurance that a Cyclotherm gives protection against operating and maintenance headaches.

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flavors not only are partially water soluble but are quite volatile. If steam is used for heating the vegetable in an open vessel, some flavor is leached out in the condensate, but much more of it is distilled off into the air. A closed steaming vessel allows less loss by each of these means. Boiling water allows leaching, but practically no distillation occurs if the vessel is closed. The seed coat of whole grain corn, lima beans, soybeans and field peas greatly reduces the loss through leaching. This explains why cooking in water may give a product as much or more flavor than cooking in steam. But in all cases, the vessel should be kept closed. Cooking under low steam pressure is desirable. With some products it is preferable to using live steam. It was found, however, that cooking vegetables under a steam pressure of more than 10 lb. cooks the outside before the products are cooked internally.

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—End—

The Low-Down On Butter

(*Continued from page* 99)

of the quarterly available civilian supply of each of these commodities.

Each civilian has 50 red points a month to spend at his discretion —provided, of course, the desired commodities are available. In theory, this seems plausible and workable. In practice, it is something else. Unfortunately, it has not been possible to get each commodity into all markets in quantities approaching the desires of potential purchasers in these various markets. There have been times when New England wanted butter and had the points for it, only to find that there was no butter because the provisions of an OPA order were such as to discourage sending butter into New England. At the same time, advantageous freight allowances caused other markets to get

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more than their share of butter.

This year, the serious meat shortage has necessitated higher point values on meats, especially on the most desirable cuts. If meat is available, the man of the house wants meat—steaks, if they and the necessary points are at hand. Though many a desire for a steak has been settled for with a piece of liver or a slice of bologna, meat has had first call on the red points. If no meat is available, butter may be purchased.

But with only 50 red points per capita per month, the most red-point-wise housewife cannot purchase all the things she wants in the amounts she wants them. And furthermore, because of shortages in many commodities, shoppers must take what is available. This is a very disruptive element in the efficient planning of point spending.

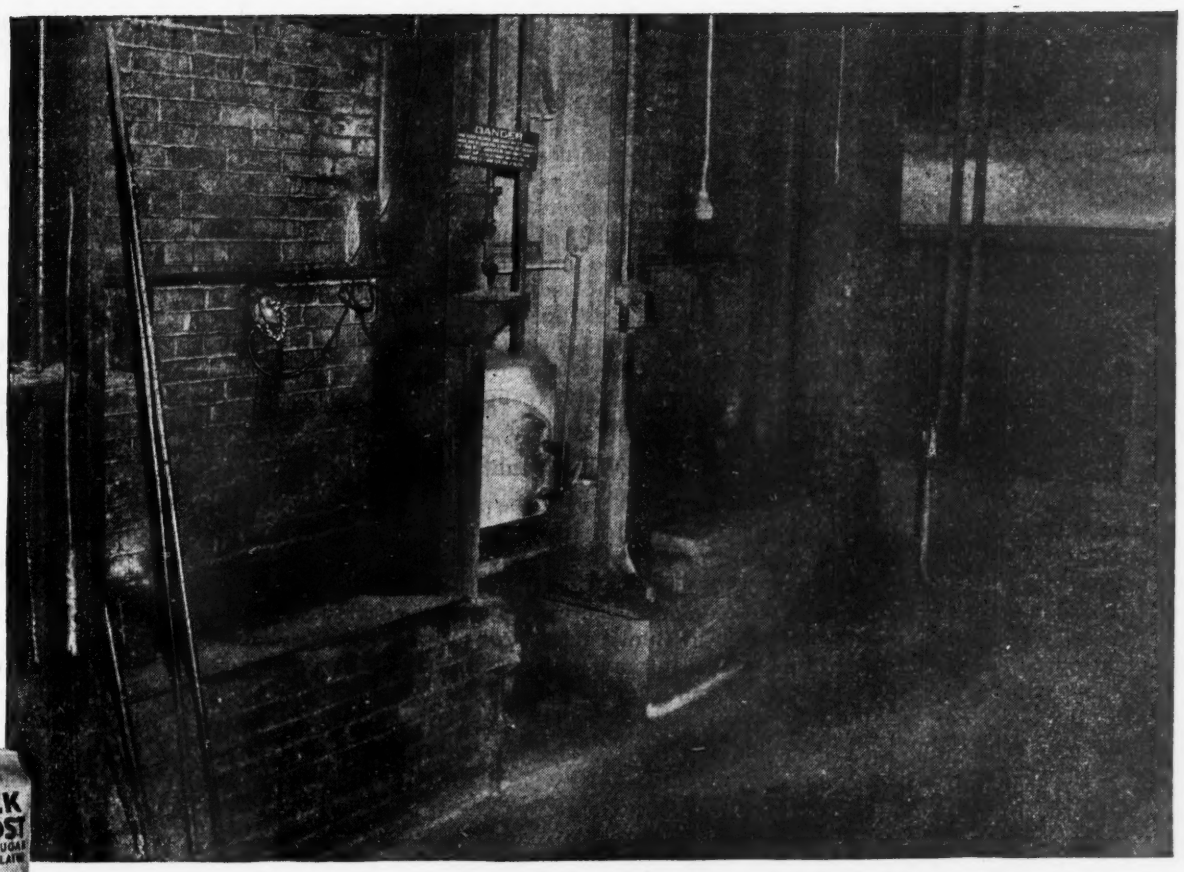
A 24-point value was maintained on creamery butter through the flush season and up to the middle of July. On a purely theoretical basis, such a value appeared justified because of the limited supply. It must be remembered that there was a 55 percent set aside for May, 55 percent for June and 50 percent again for July, leaving less than 85,000,000 lb. of creamery butter for civilians for each of these months.

Butter Backs Up

But theory and practice clashed, causing a near calamity. In many markets, consumers did not have sufficient points to buy the meager supply which, theoretically, was their share. Butter did not move from the retailers' shelves. It backed up in commercial channels not because of price, but because of point value. Manufacturers and distributors were forced to put butter in cold storage to save it. And storage stocks climbed until, by July 1, there was nearly 59,000,000 lb. of the civilians' share of butter in storage. Furthermore, unusually favorable conditions for milk production continued through June and July, and there was less falling off in butter production than the government agencies had expected.

These facts, plus some other factors, caused OPA to drop butter from 24 to 16 points. Since that time, the government has scaled down its requirements somewhat, as indicated by the reduction from 30 to 20 percent in the August set-aside.

It must be remembered, too, that a new Secretary of Agriculture with increased authority took office



Typical char-revivifying kiln used in refining "Jack Frost" sugars. Thermocouple which detects temperature is mounted in peep-hole, and connected to Micromax Recording Pyrometer shown below.

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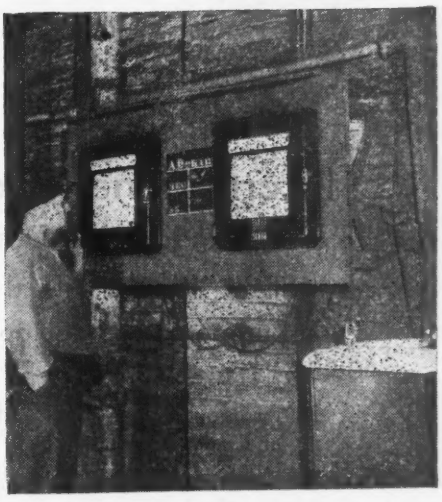

Pair of Micromax Recorders, each showing temperature of five char-revivifying kilns. Temperature is about 1025 F, but Micromax instruments are dependably accurate and economical at all temperatures from sub-zero up.

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on July 1. And he has been active in carrying out his promise to give civilians as much of the essential foods as possible without impairing the war effort. There is butter in all markets as this is being written; and with the point value reduced, it is moving into consumer channels. Hotels and restaurants still are limiting their servings of butter because of their limited allowance of red points per customer. But as meat and butter supplies improve, this situation also should improve.

More Milk, Less Butter

Any procedure for relief, however, will not help the overall long-time butter problem. It will be only an expediency. It has been estimated that 1945 will see a bumper crop of milk—an all-time of some 121,000,000,000 lb. Yet creamery butter production will be the lowest for many, many years. Although a full discussion of all the factors which brought about this paradox is not possible here, the chief and basic cause has been the pricing scheme established by government agencies.

Price ceilings established by OPA have placed butter prices in an uneconomic position as compared with other dairy products which compete with butter for its raw material—butterfat. A large amount of fat which would go into butter manufacture under normal conditions has been diverted into other products. Then, too, a sizeable number of those who could not sell whole milk from their farms because of their location have quit producing butterfat. They have found that they can obtain greater financial returns by diverting their limited labor supply into other activities.

Why Quality Suffers

Much could be written on the causes for the poor quality of some of our present butter supply. It is sufficient to say, however, that the same basic causes for the decrease in total butter production, with its resultant limited supply for civilians, are also the basic causes of lowered quality. Whenever there is a shortage of any commodity for which there is an active demand, inferior products creep into the market.

Stop and consider what has happened to such products as cigarettes, cigars and straw hats. Or ask any woman what she thinks of the stocking situation.

The one remedy for most of our present difficulties with butter is—more butter. But to get more butter there must be a reversal in some of the policies of government agencies. Price ceilings of all dairy products must be adjusted so that it will be profitable for the farmer to produce butterfat, for the processor to make butter, and for the distributor to distribute butter.

What's more, an abundance of butter automatically will clean up the quality problem. There always has been good butter, and there always has been some poor butter. When there has been an adequate supply of good butter, the undergrade had to find outlets where it could be used satisfactorily. And this butter usually sold at prices agreeable to the buyer. During this period of extreme butter shortage, the scramble for butter has enabled butter of poor quality to get into consumer channels where it could not go under normal conditions. Poor butter can be eliminated by making the production of it unprofitable. But to do this there must be an adequate supply of good butter.

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